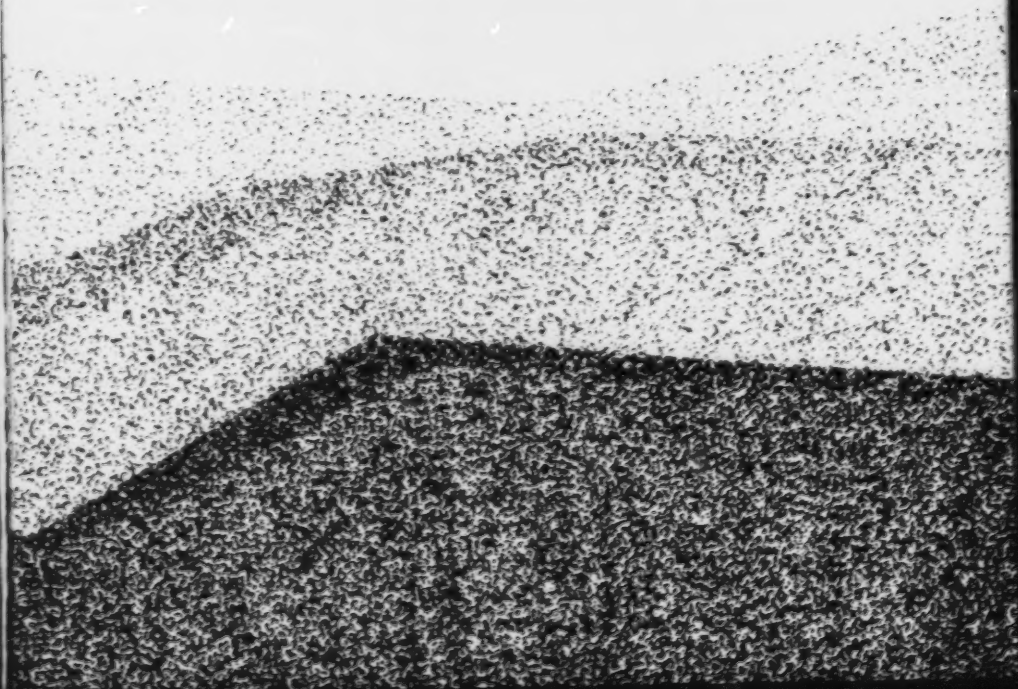


Centre for Resource Studies
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Kingston, Ontario



**The Impact of
Policy Change on
Decisions in the
Mineral Industry:
The Case of Exploration
in Manitoba, 1969-77**

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Preface

Increasing government involvement in and regulation of the mineral industry has been a matter of concern over the past decade. However, the result of such government activity in terms of its impact on resource allocation and efficiency of utilization is difficult both to isolate and to identify.

In this study, the authors have made a detailed examination of the impact of a particular set of Manitoba government policy changes in relation to the mineral exploration of five private-sector firms, and on exploration in the province in general. Changes in the structure of the exploration decision-making process are revealed, as well as shifts in the autonomy of individual actors in the process. The short-term results include a reduction in private-sector exploration in the province, and a substantial increase in public-sector exploration.

The Centre for Resource Studies is pleased to present this work as an informative contribution to the current debate on government mineral policies.

Views expressed are those of the authors, and do not necessarily represent those of the Centre nor of its sponsoring organizations.

C.G. Miller
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Contents

- Preface / iii
- Foreword / ix
- Summary / x
- Résumé / xiii
- 1 Introduction / 1
 - Purpose of the Study / 1
 - Exploration Decisions / 1
 - Decision Structure / 3
 - Management of the Mineral System / 3
 - Plan of the Study / 6
- 2 Industry Background / 8
 - The Mineral Industry in Manitoba / 8
 - Exploration / 11
 - Provincial Government Mineral Policies / 15
 - Federal Government Policies / 26
- 3 Sherritt Gordon Mines Limited / 29
 - Background / 29
 - Ruttan Lake Project / 30
 - Counsel Lake Project / 33
 - Subsequent Developments / 38
- 4 Hudson Bay Mining and Smelting Company Limited / 39
 - Background / 39
 - Rusty Lake Project / 40
 - End-Jit Claims / 44
- 5 International Nickel Company of Canada Limited / 49
 - Background / 49
 - Thompson Discovery / 50
 - Base Metals Explorations / 53
 - Phillips Lake Exploration / 54

6	Noranda Mines Limited / 57
	Background / 57
	Morton Lake Project / 57
	Seal River Project / 61
7	Rock Ore Exploration and Development Limited / 67
	Background / 67
	Arbour Lake Property / 68
	Diane Property / 70
	Begg Lake Property / 72
8	Exploration Operations Branch of The Government of Manitoba / 73
	Background / 73
	Uranium Exploration / 75
	Base Metal Exploration / 75
9	Analysis of Cases: Changes in Decision Structure / 77
	Introduction / 77
	Changes in the Structure of Exploration Decisions / 77
	Summary of Changes in Decision Structure / 82
10	Analysis of Cases: Results of Changes in Decision Structure / 84
	Exploration Decision Process / 84
	Management Decision Autonomy / 87
	Exploration Activity / 88
11	Conclusions
	Decision Structure / 90
	Decision Process / 90
	Shifts in Autonomy / 91
	Some Significant Factors / 92
	Effects on Exploration Decisions / 93
	Implications / 93
	Afterword / 95
	Appendix I: Summary of Changes in Federal Taxation of the Mineral Industry / 97
	Appendix II: Private Sector Participants in Manitoba Mineral Exploration, 1960-76 / 101
	Appendix III: Terminology / 109
	The Authors / 115
	The Centre for Resource Studies / 116
	Tables
1	Manitoba: Production of Selected Minerals as a Percentage of Canadian Production / 11

- 2 Manitoba: Census Value Added in Goods-Producing Industries / 12
- 3 Value of Production of Selected Minerals as a Percentage of Value of Total Mineral Production for Manitoba, 1966-76 / 13
- 4 Indicators of Exploration Activity in Manitoba, 1960-77 / 14
- 5 Ranking of Jurisdictions in Order of Decreasing Rate of Return / 15
- 6 Estimated Cost of Projects Under the DREE-Manitoba Subsidiary Agreement on Mineral Exploration Development, 1976 / 28
- 7 Sherritt Gordon Exploration Expenditures, 1967-77 / 30
- 8 Hudson Bay Exploration and Development Exploration Expenditures in Manitoba and Saskatchewan, 1950-76 / 41

Illustrations

- 1 Structure of Exploration Decisions / 4
- 2 Spectrum of Government Involvement in Decision Structure / 5
- 3 Major Mining Centres in Manitoba / 9
- 4 Manitoba Mineral Production, 1926-76 / 10
- 5 Changes in Mineral Policy in Manitoba, 1969-77 / 17
- 6 Organization Chart, Department of Mines, Resources and Environmental Management / 23
- 7 Mines and Mining Properties, Lynn Lake Area / 31
- 8 Mines and Mining Properties, Snow Lake-Flin Flon-Sherridon Area / 42
- 9 Inco Exploration Expenditures in Manitoba, 1949-77 / 50
- 10 Mines and Mining Properties, Thompson-Wabowden Area / 51
- 11 Case History: Rat River Area / 54
- 12 Property Location Map, Rock Ore Exploration and Development / 69
- 13 Location of 1976 Activities of Exploration Operations Branch / 74
- 14 Relationship Between Size of Economic Orebody and Probability of Finding / 81
- 15 Direction of Changes in Mineral Exploration Decision Structure in Manitoba, 1969-77 / 83
- 16 Change in Distribution of Decision-Making Activity as a Result of Policy Change / 86



Foreword

The study of business-government relations is fascinating. However, it is still at an early stage and we have much to learn about the influence of these two sectors upon each other. This study involves a detailed examination of one aspect of economic decision-making activity – mineral exploration in Manitoba. We were able to identify changes in the roles of private and public sector managers, changes in the decision structure that were caused by changes in government policy, and some of the resultant consequences.

The study would not have been possible without the cooperation and assistance of a number of people, and we would like to acknowledge those who have been of help to us.

Many business and government people who are directly involved in, or interested in, mineral exploration in Manitoba took many hours from busy schedules to provide information for our case studies. We would like to thank each one of them, but because some have requested anonymity we shall not identify any individually.

The Centre for Resource Studies at Queen's University provided financial assistance to meet the expenses incurred in gathering data for the study and for its analysis. We are grateful for this, and in addition, for the assistance provided by members of the Centre, which included commenting upon and improving the initial proposal, helping us to contact people at our data collection stage, and providing editorial assistance in the final stages of writing the final report.

We would also like to thank Cathie Austin, who collected some of the industry background data, and Carole Corbett who typed the first two drafts.

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Summary

It has often been remarked that Canada has a 'mixed' economy, with both private and public (government) components. Within a particular economic segment such as the mineral industry, the course of events is determined by decisions taken by both public and private decision makers. These two sets of decision makers interact within a framework we call the 'decision structure'. The decision structure is defined by the following elements:

- i the identity of the decision makers – who is involved in a decision or a set of decisions?
- ii the choices available – what options are open to the decision maker(s)?
- iii the decision criteria – on what grounds are decisions taken?
- iv the payoffs – assuming a decision is successful, what benefits accrue?

Changes in the decision structure can be brought about by new government policies and regulations. The private decision makers may have more autonomy or less autonomy as a result. The operation of the mineral sector will be affected correspondingly.

The purpose of this study was to determine, given the changes that have occurred in federal and provincial policies in the last decade, whether the public/private decision structure has been substantially altered, and if so, to assess the resulting effects on the autonomy of private managers. To keep the study within manageable bounds, it was restricted to the case of base metal exploration decisions in Manitoba. Exploration decisions were selected because they are more sensitive to government action than later stages in the mineral production process. Manitoba was selected because of dramatic changes in the policy stance of the government towards the mineral sector, changes that were instituted by the Schreyer government between 1969 and 1977. Individual exploration decisions of five companies were examined before, during, and after the major policy changes.

Significant policy changes that occurred in the period under discussion included:

- i a major increase in the taxation of mining companies at both federal and provincial levels;
- ii establishment of a Manitoba Crown corporation and a departmental branch to perform independent mineral exploration;
- iii regulations permitting the Manitoba government to participate in any private exploration program on a shared-cost basis, with an option to participate in subsequent development and production activities.

We found that these policies dramatically changed the pre-existing structure of exploration decisions in Manitoba in the following ways.

- i The identity of the decision maker changed. Whereas previously, private firms had had exclusive jurisdiction in deciding where and when to explore, and for what minerals (within a standardized regulatory framework), now the Manitoba government became actively involved as a principal, through Manitoba Mineral Resources Limited and through the Exploration Operations Branch of the Department of Mines, Resources and Environmental Management.
- ii Decision options were reduced for private managers and expanded for those in the public sector. Private sector managers lost the option to undertake, independently, new exploration. Manitoba gained the options of directing independent exploration programs and of participating in certain programs initiated by the private sector.
- iii Criteria used by private managers continued to be basically economic: those technical and financial considerations associated with finding and developing viable deposits. The decision criteria applied by government representatives were more socially oriented than those of private companies.
- iv The potential payoffs for private companies for successful exploration were substantially reduced by changes in the federal income tax and in the provincial royalty tax.

The consequence of all these changes was a decrease in the autonomy of private managers in Manitoba who had previously been accustomed to making independent exploration decisions. An important additional outcome was that the increase in government involvement had the effect of changing, for a time at least, the process by which exploration decisions were made within mining companies. During the period of great uncertainty preceding and after the implementation of the Manitoba government's policy changes in 1975, there was a centralization of decision making within private companies. In other words, more senior managers at company head offices became involved in exploration decision making. As a result, the autonomy of regional managers was decreased still further. This centralization increased costs for the private sector and created

extra time demands on senior management. There is evidence to suggest, however, that this phenomenon was a temporary one; as the situation stabilized, decisions were again made with greater input from regional managers in Manitoba.

Effects can also be traced on the exploration performance of the mineral sector. Because of decreases in private options and payoffs, Manitoba became less attractive to the private sector. Exploration had previously been carried out by three classes of organization:

- i small independent exploration companies;
- ii major firms already having substantial mining and processing operations in Manitoba;
- iii major firms with no operations in Manitoba.

Small independent companies encountered greater difficulty raising private funds for exploration in Manitoba. They were able, however, to participate in the joint funding program with the Manitoba government. Most primary base metal exploration by the private sector after the 1975 Manitoba government policy changes was conducted by firms that had to find additional ore for existing processing facilities in Manitoba. With some exceptions, major firms with no producing operations in Manitoba found the province less attractive and ceased exploration.

As a result, after 1975 there was a significant decrease in private exploration for base metals in Manitoba. However, interest in uranium took up some of the slack. Moreover, government funding of exploration largely compensated for the remaining loss. In 1976-77, the government accounted for an estimated one-half of all exploration expenditures in Manitoba. By assuming an active role, the government was able to maintain a high level of exploration in the province.

The final, and perhaps most important, aspect of the new decision structure concerns exploration performance: was it as effective in discovering mineral deposits as the previous system had been? Theorists may debate whether governments have the expertise, motivation, or organization to conduct exploration programs successfully. It is too early to determine empirically whether the 1975 Manitoba system would have led to an acceptable discovery rate. Furthermore, the evidence may never be sufficient, as the Progressive Conservative government, elected in 1977, has reversed many of the NDP government initiatives. One important question to bear in mind, when considering the consequences of governments embarking on such programs, is whether it is appropriate to invest public money in a high-risk venture like mineral exploration. By doing so, governments assume some of the responsibility for the success or failure of exploration. This measure of government performance, unlike many others, is quantifiable.

Résumé

On a souvent remarqué que le Canada avait une économie 'mixte', avec des composantes à la fois privées et publiques (gouvernementales). Au sein d'un segment économique particulier tel que l'industrie minière, ce sont les décisions prises à la fois par les décideurs publics et privés qui déterminent le cours des événements. Ces deux groupes de décideurs agissent l'un sur l'autre dans un cadre que nous appellerons 'la structure de décision.' Cette structure de décision se définit par les éléments suivants:

- i l'identité des décideurs: qui prend part à une décision ou à un ensemble de décisions?
- ii les choix possibles: quelles options se présentent au(x) décideur(s) qui prend (prennent) les décisions?
- iii les critères de décision: à quel titre les décisions sont-elles prises?
- iv les profits: en supposant qu'une décision soit couronnée de succès, quels bénéfices en tire-t-on?

De nouveaux règlements et politiques du gouvernement peuvent amener des changements dans cette structure de décision. Il se peut que les décideurs dans le secteur privé voient alors leur autonomie diminuer ou croître selon le cas. Le secteur minéral sera affecté en conséquence dans son exploitation.

Le but de cette étude était de déterminer, vu les changements qui se sont produits dans les politiques fédérales et provinciales au cours de la décennie passée, si la structure de décision publique/privée avait réellement été modifiée, et, le cas échéant, d'en évaluer les effets en résultant sur l'autonomie des gestionnaires privés. Pour contenir cette étude dans des limites raisonnables on la réduisit aux décisions relatives à la prospection de métaux de base au Manitoba. On choisit les décisions relatives à la prospection parce qu'elles sont plus sensibles aux mesures gouvernementales que les étapes subséquentes du processus de la production minière. On choisit le Manitoba à cause des changements spectaculaires dans la position politique du gouvernement envers le secteur minéral que le gouvernement Schreyer institua entre 1969 et 1977. Des cas individuels de décisions relatives à la prospection prises par diverses sociétés ont été

examinés avant, pendant et après ces changements importants de politique.

Les changements de politique profonds qui se sont produits pendant la période examinée comprennent:

- i une hausse substantielle de l'imposition des sociétés minières tant au niveau fédéral que provincial;
- ii la création au Manitoba d'une société de la Couronne et d'une direction ministérielle chargés de prospection minérale indépendante;
- iii des règlements permettant au gouvernement du Manitoba de participer à tout programme privé de prospection en partageant les frais avec l'option de participer ensuite à la mise en valeur et à la production.

Nous avons constaté que ces politiques changèrent d'une manière catégorique la structure telle qu'elle existait des décisions relatives à la prospection au Manitoba, et ce de la façon suivante:

- i L'identité du décideur changea. Alors qu'auparavant les firmes privées avaient eu la juridiction exclusive sur les décisions relatives au site, à la date d'une prospection ainsi qu'aux minéraux qui en feraient l'objet (dans le cadre d'un certain nombre de règlements standardisés), le gouvernement du Manitoba participait maintenant activement à ces décisions par l'intermédiaire de Manitoba Mineral Resources Ltd., et de *Explorations Operations Branch* du ministère des *Mines, Resources and Environmental Management*.
- ii Les gestionnaires privés virent leur choix de décisions diminuer alors que ceux du secteur public les virent augmenter. On enleva aux gestionnaires privés le choix d'entreprendre en toute indépendance de nouvelles prospections. Le Manitoba gagna les options de diriger des programmes de prospection indépendants et de participer à certains programmes lancés par le secteur privé.
- iii Les critères qu'utilisaient les gestionnaires privés continuaient à être fondamentalement économiques: on associait ces considérations techniques et financières à la découverte et à la mise en valeur de gisements viables. Les critères de décision appliquées par les représentants du gouvernement prenaient une orientation plus sociale que ceux des sociétés privées.
- iv Les profits potentiels que les sociétés privées pouvaient escompter de prospection couronnée de succès diminuèrent considérablement à cause des modifications des impôts fédéraux et des redevances provinciales.

Il résultait finalement de tous ces changements que l'on diminuait l'autonomie des gestionnaires privés du Manitoba alors qu'on les avait habitués à prendre des décisions indépendantes relatives à la prospection.

Une autre conséquence importante était que la participation accrue du gouvernement eut pour effet de modifier pour un certain temps du moins le processus par lequel les sociétés minières prenaient leurs décisions relatives à la prospection. Durant la période de grande incertitude qui précéda et qui suivit la mise en œuvre en 1975 des changements de politique du gouvernement du Manitoba, il se fit une centralisation des prises de décisions au sein des sociétés privées. En d'autres termes, un plus grand nombre de gestionnaires de rang supérieur dans les sièges sociaux des sociétés participait maintenant aux prises de décisions relatives à la prospection. Il en résulta que l'autonomie des gestionnaires régionaux diminua encore plus. Cette centralisation augmenta les frais du secteur privé et les gestionnaires de rang supérieur durent consacrer plus de temps à la prise de décisions. Quelques indications suggéraient cependant que ce phénomène était temporaire; à mesure que la situation se stabilisait, les décisions se prenaient à nouveau avec une participation plus grande des gestionnaires régionaux du Manitoba.

Les effets se font ainsi sentir dans la façon dont le secteur minéral mène à bien la prospection. Parce que les options et les profits du secteur privé allaient en diminuant, le Manitoba devint une localité moins intéressante que précédemment pour la prospection privée. La prospection avait auparavant été effectuée par trois classes d'organisation.

- i de petites sociétés de prospection indépendantes;
- ii des firmes importantes qui faisaient déjà beaucoup d'exploitation minière et de traitement de minéraux au Manitoba;
- iii des firmes importantes n'ayant pas d'exploitation au Manitoba.

Les petites sociétés indépendantes éprouvaient plus de difficulté à se procurer les fonds privés pour faire de la prospection au Manitoba. Elles parvinrent pourtant à participer au programme de financement commun avec le gouvernement du Manitoba. La plus grande partie de la prospection des métaux de base primaire entreprise par les sociétés après les changements de politique de 1975 du gouvernement du Manitoba fut effectuée par celles qui devaient trouver du minéral supplémentaire pour des installations de traitement déjà en existence au Manitoba. A quelques exceptions près, les firmes importantes n'ayant pas d'exploitation au Manitoba trouvèrent la province moins intéressante et se retirèrent.

Il en résulta une baisse sensible de la prospection privée des métaux de base au Manitoba. Cependant l'intérêt porté à l'uranium compensa quelque peu ce ralentissement des activités. En outre, les fonds que le gouvernement accorda à la prospection compensèrent largement le reste des pertes. En 1976-77, la participation du gouvernement représentait environ une moitié de tous les frais de prospection au Manitoba. En

assumant ce rôle, le gouvernement put maintenir un niveau élevé de prospection dans la province.

Le dernier aspect, et peut-être le plus important, du rendement de la prospection est la question de savoir si la nouvelle structure de décision serait aussi efficace que l'ancien système pour découvrir des gisements de minéraux. Les théoriciens peuvent se demander si les gouvernements ont l'expertise, la motivation ou l'organisation nécessaires pour mener à bien des programmes de prospection. Il est trop tôt pour déterminer empiriquement si le système du Manitoba en 1975 aurait résulté en un taux de découvertes acceptable. De plus, il se peut qu'il n'y ait jamais assez de preuves, puisque le gouvernement Lyon, élu en 1977, a pris le contre-pied de bien des initiatives du Manitoba. Une implication importante, cependant, est que les gouvernements qui s'embarquent dans de tels programmes doivent se demander s'il convient d'investir des fonds publics dans une affaire aussi risquée que la prospection minérale. Ce faisant ils se rendent responsables des résultats positifs de la prospection. Alors que ce n'est souvent pas le cas, on peut ici quantifier le rendement gouvernemental.

1. Introduction

Purpose of Study

Increased government involvement in business is one of the most significant developments in Canada in recent years. It has created problems of strategy formulation and implementation for managers in both private and government organizations. Business managers care about the effect of government policies upon the economic performance of Canadian industry, and they sometimes feel that government representatives are unwilling to listen seriously to their concerns. Government managers, while aware of the importance of a healthy and growing business sector, are also interested in maintaining a balance between economic and social criteria.

There is a shortage of information about the actual effect of the implementation of government policies on business practices and operations. This study proposes to examine how a specific type of economic decision making - that associated with mineral exploration - has been affected by specific changes in government policy.

The structure of mineral exploration decisions is described and examined both before and after the policy changes, and analyzed for changes brought about by the new policies.

The objective is to determine whether there has been any real shift in the balance of decision-making responsibility from the private to the public sector. The central question is: have provincial and federal government policies introduced in the last decade significantly altered the exploration decision structure in the mineral system in Manitoba, and if so, how have these changes affected the relative autonomy of company managers?

Exploration Decisions

Managers in the mineral system must decide whether or not to explore in a certain region, what areas within that region to explore, and what type of reconnaissance and ground follow-up exploration is required. The

various components of exploration decisions arise at different points in time and require different types of information.

REGIONAL SELECTION

Regional selection involves the choice of a jurisdiction within which to explore, and can be based upon consideration of a number of economic, political, and technical factors, including:

- i the minerals sought;
- ii the political rules, and uncertainty, particularly with respect to regulation and taxation;
- iii company circumstances, including facilities, expertise, and budget;
- iv probability of finding an economic ore deposit;
- v attitude of management to the region;
- vi market situation for minerals;
- vii infrastructure, such as transportation, power, and townsites.

AREA SELECTION

After selection of a region, the next decision concerns the choice of an area within the region. Slightly different factors may have to be considered in making the area decision, including:

- i minerals sought;
- ii geology of the region;
- iii differential political rules within the region;
- iv company circumstances, particularly existing facilities;
- v exploration philosophy of company;
- vi infrastructure distribution within region;
- vii previous exploration within the region;
- viii exploration budget of company.

RECONNAISSANCE

The decision stages following area selection tend to be more routine and more technical, and involve a more specific geographic area. There may be a choice among a variety of reconnaissance methods, such as airborne reconnaissance, prospecting, and ground reconnaissance.

The selection of any one of these methods or a sequence of them will vary with the company involved and the technology available. Prospecting, for example, is becoming a 'lost art.' Common until the mid-1950s, it has given way almost entirely to airborne reconnaissance.

Ground reconnaissance may be carried out first, to verify rock types, trends in formations, and topography, and to outline more specific areas for subsequent airborne geophysical surveys. Anomalies, or unusual min-

eral occurrences, are identified in the air survey data and plotted on aerial photographic maps.

FOLLOW-UP GROUND EXPLORATION

After airborne survey results are available and anomalies have been identified and outlined, a decision must be made about which anomalies to investigate. Anomalies are assigned priorities based on electromagnetic and magnetic data from the airborne survey, and the highest priority anomalies are usually examined first. Other follow-up ground decisions include what ground to stake, what ground geophysics to undertake, and when and where to drill. Often there may also be decisions about whether to work alone or to bring in partners.

Decision Structure

The decision structure is the framework for studying any decision. A decision can be viewed as the choice of a particular action from among a number of available options. The choice is made after evaluating the options on the basis of certain explicit or implicit criteria. The structure of a decision has four components:

- i the decision maker;
- ii the options available;
- iii the decision criteria;
- iv the payoffs associated with the various options.

It has already been seen that exploration decisions can also be divided into four components. The two sets of components can be combined, as shown in figure 1, to give a complete picture of the structure of exploration decisions. Each of the resulting categories will be examined in chapter 9 for evidence of change resulting from changes in government policies.

Management of the Mineral System

The key task of management, whether in the private or public sector, is making decisions that determine the purpose of the organization and, on a day-to-day basis, carrying out the various system functions. In a classical *laissez-faire* decision structure, decision makers are faced with no government regulations to restrict their range of decision options, are free to establish their own goals, and have no government incentives, taxation, or other measures to affect the payoff from their actions.

However, it is characteristic of a mixed economy like Canada's that government input occurs in each of the four components of the decision

Decision Structure Components	Exploration Decision Components			
	Region	Area	Reconnaissance	Ground Follow-up
Decision maker	Decision maker/ region	Decision maker/ area	Decision maker/ reconnaissance	Decision maker/ ground follow-up
Options	Options/region	Options/area	Options/ reconnaissance	Options/ground follow-up
Criteria	Criteria/region	Criteria/area	Criteria/ reconnaissance	Criteria/ground follow-up
Payoff	Payoff/region	Payoff/area	Payoff/ reconnaissance	Payoff/ground follow-up

Figure 1. Structure of exploration decisions

Relative Government/Business Involvement		
Decision Structure	More Business, Less Government	Less Business, More Government
Who makes decisions?	Private sector managers	Private managers, under supervision, or with approval of government or its agent (regulated decisions)
		Government managed firms (nationalized decisions)
What options are available?	Full range of options	Government regulations eliminate more and more business options for actions or timing of actions
What decision criteria are applied?	Economic decision criteria	More and more emphasis is placed upon social and political decision criteria in addition to, or instead of, economic
Do governmental factors influence the payoffs associated with various options?	No government programs	More and more taxation, tariff, incentive and other programs with financial implications for makers of economic decisions

Figure 2. Spectrum of government involvement in decision structure

structure (see figure 2). Government regulations can alter or eliminate some options, and influence the timing of actions of economic decision makers. Government decision makers can introduce social and political criteria to the basically economic criteria of private business in the making of economic decisions. Finally, government programs such as taxation, tariffs, and incentives influence the potential payoffs of the options available to decision makers.

Government can make a choice between leaving the private sector to operate on its own and getting a return from taxation, or participating directly in discovery, recovery, processing, and sale of minerals. In either case, it is possible that the governmental input into decisions can become so pervasive that the private company manager experiences a significant loss of autonomy in decision making.

The autonomy of a manager implies:

- i authority to make decisions independently;
- ii a range of options which has not been substantially limited by some other person or group;
- iii freedom to choose the criteria upon which decisions are based;
- iv payoffs that are not so circumscribed by governmental or other restrictions that the decision maker has virtually no choice but to follow a certain course of action.

The relative involvement of government and business in the decision structure is indicative of the extent to which each is responsible for management of the mineral system. As government involvement increases, it may result in changes that restrict the freedom of private sector managers to make decisions; when this happens, government assumes increased responsibility for management of the mineral system.

Plan of the Study

The mineral system in Manitoba between 1969 and 1977 provides an excellent opportunity for study. First, it is an important industry in Manitoba and Canada: it contributes employment, export sales, and support for the Canadian dollar, and it interrelates with a number of other industries which buy from or sell to the mineral system. Secondly, from 1969 to 1977, when the New Democratic Party (NDP) was in power in Manitoba, provincial government policy toward the mineral industry was reviewed and changed significantly.

Decisions concerning base metal mineral exploration alone were selected for study, rather than decisions related to all aspects of the mineral system, since it would be difficult to cover the full range of

mineral activities in a single study, and base metal exploration is a particularly sensitive indicator.

Chapter 2 contains background information on the mineral industry in Manitoba, and outlines major federal and provincial government policy changes relating to the industry between 1969 and 1977.

Chapters 3 to 8 contain the case studies which form the primary data base for the analysis of change in the decision process. The case studies depict exploration decisions in a number of different organizations both prior to and following the policy changes. Data were collected from published sources, interviews with company and government personnel, and organization records. Case materials were written in preliminary form and returned to sources for verification and additional information until both the organization managers and the researchers were satisfied. In examining the case material, the reader should look for indications of changes in the decision structure and the effects which these changes had upon private and government exploration decisions.

Analysis of the data takes two forms. First, chapter 9 looks at changes that occurred in the structure of the exploration decision process, following the government policy changes. Second, chapter 10 deals with changes in the dynamics of the decision process, including shifts in decision-making authority, loss of autonomy by company managers, and actual exploration decisions of company and government managers. It also examines the way in which differences in company circumstances led to different courses of action.

Chapter 11 contains the conclusions of the report, and some implications of the findings.

2. Industry Background

The mineral system in Manitoba is composed of all the groups and individuals involved in the discovery, recovery, processing, and sale of minerals. The discovery, or exploration, involves finding new mineral deposits. Recovery relates to mining of minerals. Processing involves activities from concentrating to smelting. Selling minerals refers to making goods available to customers.

This chapter outlines the history and importance of the mineral system in Manitoba, and the roles of the Manitoba and federal governments in the system.

The Mineral Industry in Manitoba

For over 200 years prior to the end of the 19th century, northern Manitoba was primarily a fur-producing area. In 1912, when the boundaries of the province were extended northward, the newly acquired territory was still regarded as fur country. It was not until the 1930s that mineral production reached significant proportions in northern Manitoba.¹

Since the turn of the century, the mineral industry has focused on a variety of minerals. Gold, copper, and zinc were of prime importance in the 1930s, while over the last twenty years, nickel, copper, and zinc have been most important. The growth of the industry since the 1930s may be attributed to a number of factors, including the completion of a suitable transportation network, particularly air transport to more isolated areas; improvement in metallurgical techniques; and an increase in the selling prices of minerals. Today, the significant metals in Manitoba are gold, silver, copper-zinc, and nickel-copper; others include tantalum, cesium, and lithium. Figure 3 illustrates the principal locations of mining activity in the province.

The value of mineral production in Manitoba in 1976 was \$478 million, an increase of 245 percent over the level of production in 1965 (figure 4). Manitoba ranked fifth among the provinces in terms of total Canadian

1. Manitoba, *Report of the Task Force on Manitoba Minerals Policy* (Winnipeg, March 1974), p. 1.

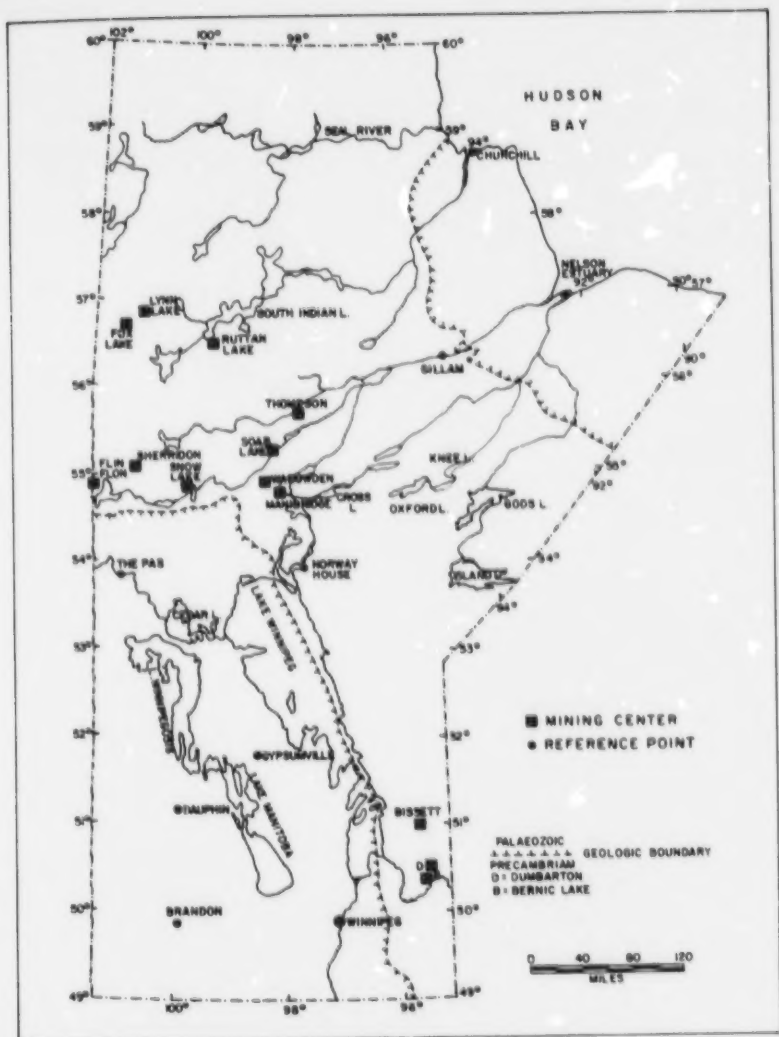


Figure 3. Major mining centres in Manitoba

Source: *A History of Mining in the Province of Manitoba* (Vancouver: *Western Mining* special publication, 1970).

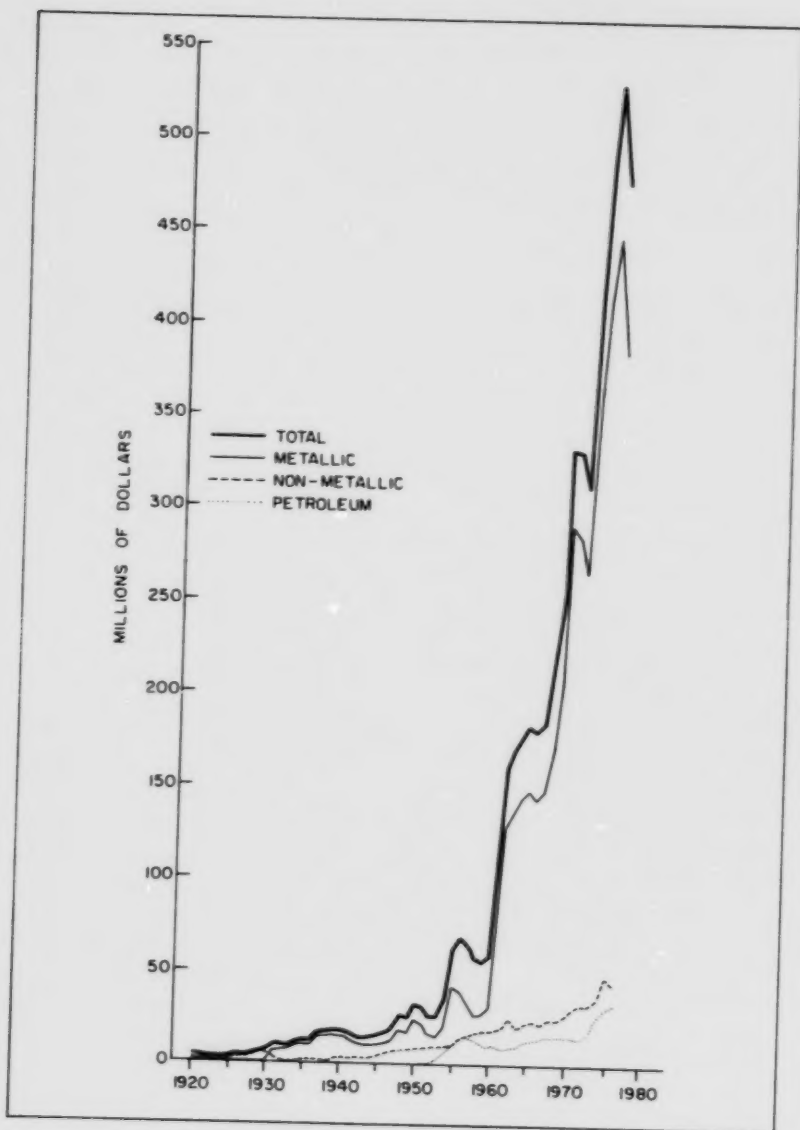


Figure 4. Manitoba mineral production, 1926-76

Source: Report of the Task Force on Manitoba Minerals Policy, March 1974, p.3.

Table 1

Manitoba: Production of Selected Minerals as a Percentage of Canadian Production

Year	Mineral					Total
	Nickel	Copper	Zinc	Tantalum	Others	
1966	26.08	6.20	3.63	—	.65	7.19
1967	22.37	4.83	3.26	—	.62	6.47
1968	22.26	5.47	3.93	100	.57	6.80
1969	30.69	6.49	4.05	100	.51	8.68
1970	25.88	7.14	3.15	100	.55	9.47
1971	26.32	7.86	4.91	100	—	9.67
1972	26.21	7.56	3.64	100	—	9.24
1973	28.07	7.86	4.91	100	—	9.45
1974	22.80	8.66	5.54	100	—	8.58
1975	26.27	8.79	6.06	100	—	9.35
1976 ^p	19.35	7.58	5.96	100	—	7.39

Source: Statistics Canada, *Canada's Mineral Production*, 26-202 (Ottawa: 1973-76).

p = preliminary estimate.

output of metallic minerals in 1975, producing 26 percent of Canadian nickel and 6 percent of Canadian zinc (see table 1). Mining production (including milling, quarries, and oil wells) comprised approximately 25 percent of the value added in goods produced in the province's primary industries during most of the period from 1966 to 1975 (table 2), and from about 9 to 16 percent of value added in goods-producing industries during the same period. Nickel is the most important single mineral in Manitoba, accounting for about half of the value of mineral production, with copper and zinc also making important contributions. Although tantalum production accounts for the entire Canadian output, it represents a very small proportion of total mineral production (table 3).

Exploration

Until 1971, exploration in Manitoba was conducted only by the private sector. According to reports of assessment work submitted to the government, the number of companies and individuals exploring in the province at any one time has remained relatively constant since 1960 (table 4). There was, however, a substantial turnover in companies. Of the approxi-

Table 2

*Manitoba: Census Value Added in Goods-Producing Industries
(Percent)*

	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975
<i>Primary industries</i>										
Agriculture	26.6	24.1	23.1	18.9	17.2	21.7	20.5	24.5	24.7	25.1
Forestry	0.3	0.2	0.2	0.2	0.2	0.3	0.4	0.4	0.5	0.8
Fishing	0.5	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2
Hunting and trapping	0.2	0.1	0.1	0.2	0.2	0.1	0.2	0.2	0.1	0.1
Mining	9.5	9.1	9.6	11.7	16.0	10.7	11.6	13.8	11.4	7.9
Electric power	5.2	5.4	5.3	5.7	5.7	6.2	6.1	5.1	5.5	6.2
Total	37.1	39.1	38.6	37.0	39.5	39.2	39.1	45.1	42.4	40.3
<i>Secondary industries</i>										
Manufacturing industries	39.1	39.5	37.6	37.2	38.9	40.4	40.5	36.3	39.5	42.5
Construction industry	18.6	21.4	23.8	25.8	21.6	20.4	20.4	18.6	18.1	17.2
Total	47.7	60.9	61.4	63.0	60.5	60.8	60.9	54.9	57.6	59.7
secondary industries	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Statistics Canada, *Survey of Production*, 61-202 (Ottawa: 1970, 1975).

Note: Mining includes milling, quarries, and oil wells.

Table 3

Value of Production of Metallic Minerals as a Percentage of the Value of Total Mineral Production for Manitoba, 1966-76

	Metallic Minerals					
	Nickel	Copper	Zinc	Tantalum	Others	Total
1966	54.88	15.68	5.89	—	3.16	79.60
1967	56.10	15.23	5.69	—	3.08	80.10
1968	56.10	15.87	6.13	—	2.81	80.91
1969	59.93	15.49	6.05	.16	1.95	83.80
1970	64.73	16.76	3.79	.68	1.77	87.74
1971	63.82	17.69	2.53	.88	1.26	86.18
1972	57.54	19.02	5.63	.74	2.02	84.97
1973	55.12	21.98	7.74	.28	2.72	87.84
1974	45.42	24.83	9.83	.73	3.70	84.51
1975	54.60	17.12	9.99	NA	2.90	84.61
1976 ^p	49.87	17.87	10.74	NA	2.53	81.01

Source: Manitoba, *Report of the Task Force on Manitoba Minerals Policy*, March 1974; Statistics Canada, *Canada's Mineral Production*, 26-202 (Ottawa: 1973-76).

Note: Total Minerals includes metallics, industrial minerals, and fuels.

p = preliminary estimate. NA = not available.

mately 250 companies or prospectors that were active between 1960 and 1976, fewer than sixty were active for more than two years (see appendix II).

Drilling activity in Manitoba was relatively stable from 1961 to 1969. It increased dramatically in 1970 and subsequently fell sharply. It was very low in 1975 when the new provincial mining regulations came into effect, and picked up substantially in 1976. This increase reflected the reconnaissance initiatives of the Manitoba government's Exploration Operations Branch in the Lynn Lake area, as well as a significant industry interest in uranium prospects in northwestern Manitoba.

Despite the evidence of increased drilling activity in 1976, Manitoba was not perceived as particularly attractive for exploration by some private sector managers. For example, a comparison of provincial and foreign jurisdictions, prepared by Noranda Exploration and based on the predicted rate of return for a private company from a hypothetical mine, ranked Manitoba well down in the list, the lowest of the provinces (table 5).

Table 4

Indicators of Exploration Activity in Manitoba, 1960-77

	Companies Reporting Assessment Work	Drilling Programs Reported	Meters of Drilling Reported	Claims Staked	Claim Blocks Staked ^a	Percent of Exploration Expenditure by Government ^b
1960	35	56	57,535	6,902		
1961	31	58	79,680	8,070		
1962	30	77	77,633	9,126		
1963	22	60	71,912	5,742		
1964	21	63	50,824	10,530		
1965	29	62	63,349	5,078		
1966	27	69	89,551	5,053		
1967	29	72	84,203	5,243		
1968	43	87	96,481	7,553		
1969	36	97	87,028	1,186	1,563	
1970	41	56	134,017	776	878	
1971	35	99	123,079	796	588	
1972	49	112	79,917	502	552	
1973	38	83	61,048	612	504	
1974	35	75	71,833	228	438	
1975	26	65	48,560	78	198	37
1976	50	87	93,443	NA	NA	45
1977	NA	NA	NA	NA	NA	50

Source: Manitoba, Department of Mines, Resources and Environmental Management, departmental records.

NA = not available.

^aCompanies could not file claim blocks prior to 1969.

^bEstimated by government. No estimates were made prior to 1975.

The companies studied in this project were, with one exception, among the most active over the period 1969 to 1976. They were:

- i Hudson Bay Mining and Smelting (HBM&S);
- ii Inco;
- iii Noranda Exploration (Norex);
- iv Sherritt Gordon Mines;
- v Rock Ore Exploration and Development.

Hudson Bay Mining and Smelting and Inco had producing mines and integrated processing operations in Manitoba at the time of the NDP election in 1969, and both had long-standing exploration programs in the

Table 5

Ranking of Jurisdictions in Order of Decreasing Rate of Return

Rank	Jurisdiction	Project Rate of Return (Percent)
1	United States	18.1
2	South Korea	17.6
3	New Brunswick	17.2
4	Nova Scotia	16.6
5	Quebec	16.0
6	Brazil	15.5
7	Saskatchewan	15.5
8	Philippines	15.1
9	British Columbia	15.0
10	Ontario	15.0
11	Saudi Arabia	14.0
12	Botswana	13.7
13	Ireland	13.5
14	Newfoundland	13.5
15	Northwest Territories	13.0
16	Manitoba	12.7
17	Peru	12.7
18	Papua New Guinea	12.0
19	Australia	12.0
20	Chile	11.4
21	Zambia	8.5

Source: Noranda Exploration, summary of taxes on a hypothetical new mine, 3 March 1977.

province. Sherritt Gordon had two producing mines from which it shipped concentrate to Japan and Quebec, and an ongoing exploration program in Manitoba. Noranda on the other hand had no producing mine in Manitoba. Although it had maintained exploration operations in the province for a period of years, it ceased to explore in Manitoba in 1975. Rock Ore Exploration and Development, a junior mining company, became active in 1971. Its objective was principally exploration for minerals and preliminary mining development.

Provincial Government Mineral Policies

PRIOR TO 1969

There were two distinct historical periods in government mining policy over the century prior to 1969. During the period from 1870 to 1930, the mineral resources of the province were under federal jurisdiction, with the provincial government's role limited to promoting the industry.² Following the transfer of jurisdiction over mineral resources from the federal to the provincial government by the 1930 Manitoba Natural Resources Act, the provincial government continued its emphasis on promotion of mineral exploration, and offered substantial incentives to mine operators in order to stimulate production. Although regulatory authority had been acquired, exploration decisions were left to the private sector, with the role of government consisting largely of the support of a favourable climate for private sector activity.³ The main elements of the post-1930 legislative framework of the mineral industry in Manitoba are summarized below.⁴

The *Mines Act* and accompanying regulations provided the basis for provincial government administration of mineral resources.

The *Mineral Exploration Assistance Act* permitted the government to provide financial assistance for approved exploration programs in eligible areas. The assistance was to represent not more than one-half of total exploration costs, and was limited to \$50,000 per annum to any party and \$150,000 maximum for any one property.

The *Mining Royalty and Tax Act* imposed a royalty on mineral production and a tax on mining claims. The royalty tax was administered by Manitoba's Department of Finance and was levied on the income derived from mine production. Where the net income from the operation of a mine in any year was less than \$1 million, royalty tax was applied at the rate of 6 percent, 9 percent where income was \$1 million to \$5 million, and 11 percent on income above \$5 million.

The mining claim tax was administered by the Department of Mines, Resources and Environmental Management. In addition to the royalty tax, every owner or lessee was subject to a mining claim tax of \$10 for each claim annually.

The *Mineral Acreage Tax Act* provided for a tax on all freehold mineral rights at the rate of ten cents per acre.

2. *Ibid.*, pp. 20, 21.

3. *Ibid.*, pp. 22, 23.

4. See also *ibid.*, pp. 120-30, 154.

Changes by Provincial Government

1969	Election of NDP government		
1970	Review of mining industry policy commenced		
	Enabling legislation for establishment of Crown Corporations passed		
	Increased royalty taxation		
	from 6 percent on net income under \$1 million		
	to 6 percent for net income under \$50,000		
	from 9 percent on net income from \$1-5 million		
	to 15 percent for net income above \$50,000		
	from 11 percent on net income over \$5 million		
	to 15 percent for net income above \$50,000		
1971	\$500,000 allocated for Manitoba Mineral Resources, Ltd.		
1972	Eric Kierans hired to prepare report on mining industry	1972	tax reform
			cancellation of deduction for provincial mining taxes or income related royalties after 1976
			earned depletion to replace automatic depletion allowances after end of 1976
			three year exemption from taxation for new mines terminated as of end of 1973. Accelerated capital cost allowance of 30 per cent available to extent of income from a new mine

Changes by Provincial Government		Changes by Federal Government	
1973	Kierans Report published Interdepartmental Task Force formed		
1974	Creation of Mineral Resources Division of the Department of Mines, Resources and Environmental Management gave the government additional exploration capacity Bill 77 increased royalties and gave the Governor-in-Council power to further change them	1974	no payments to province respecting acquisition, ownership or development of a resource property deductible after May 7, 1974 earned depletion system to commence May 7, 1974. Rate reduced from 33 1/2 percent to 25 percent of production profits DREE agreement signed with Manitoba to further explore mineral occurrences now submarginal with a view to finding additional ore; providing scientific and technical information; and undertaking regional appraisal of mineral resources
1975	Manitoba Regulation 328/74 was introduced. It gave the Manitoba government the option to participate up to 50 percent in any new mineral exploration in Manitoba Metallic Minerals Royalty Act which based royalties upon a company's return on investment. The royalty was 15 percent of profit base and 35 percent on profit above profit base	1975	15 percent resource profit abatement withdrawn January 1, 1976 Resource allowance deduction of 25 per cent of eligible profits, effective January 1, 1976 Earned depletion to be claimed after resource allowance, interest and exploration and development

Figure 5. Changes in mineral policy in Manitoba, 1969-77

1969 TO 1974: PERIOD OF TRANSITION

In June 1969, a New Democratic government was elected in the province, and brought with it different attitudes to the mining industry. As a result, several changes in provincial mining policy were introduced over the period 1969 to 1974 (figure 5). Amendments to the Mining Royalty and Tax Act were passed in 1970, increasing mining royalty taxes to a rate of 6 percent where mine income was less than \$50,000, and to 15 percent where income was above that. A tax reduction of 50 percent was allowed for the first three years if production commenced before 1 January 1973.

In 1970, the passage of Bill 17 allowed establishment of Crown corporations in the natural resources area. This bill was in fact a carry-over from the previous Progressive Conservative administration. On 20 June 1970, Premier Schreyer indicated that the province intended to form Crown corporations to develop natural resources to ensure industrial development.⁵ In 1971, the government allocated \$500,000 to establish a Crown corporation called Manitoba Mineral Resources Limited.

The objectives of the corporation were:

- i to explore for mineral deposits as any private company might do, but to provide for the province an earned equity position in any profits resulting from a discovery;
- ii to attract risk capital into the province by entering into joint development programs with private mining companies;
- iii to employ and train personnel resident in the province in all aspects of mineral exploration.⁶

Manitoba Mineral Resources Limited could enter into partnership arrangements with private companies, for any degree of processing, on discoveries in which it participated. The company could not, however, participate with private companies in mining or mineral processing that was based on discoveries made by the private sector.

At the Canadian Institute of Mining and Metallurgy conference in Saskatoon on 24 October 1972, Sidney Green presented his government's philosophical base for subsequent mineral policy.

The strategy of the Manitoba Government with regard to the development of its mineral resources is relatively simple. It can best be compared to what the strategy of any private mining company would be with regard to the mineral claims which it is now holding under lease. I am certain that a private mining company holding mineral leases would first of all want to retain its lease lands on conditions most favourable to itself. Secondly, it would want to have the flexibility to develop those lands as and when it chose to do so, as determined by its

5. *Winnipeg Free Press*, 22 June 1970.

6. *Manitoba, Debates and Proceedings*, Legislative Assembly (Winnipeg, 27 May 1971).

other holdings and its costs of proceeding. Thirdly, it would like to proceed with mining development on the best terms possible with payment of as small an amount of taxes as it could get away with. These observations are not made in criticism of the mining companies' policies. They amount to good common business sense. . .

The Manitoba Government has decided to follow the example of the private mining corporations. It is presently holding in trust for the people of Manitoba a substantial acreage of unstaked potential mining properties. Like the mining companies, it will try to retain control of this potential source of mineral wealth. By retaining control of this source of wealth, it will hope to have maximum flexibility in deciding as to when and under what circumstances it will be developed. In the development of these potentials it will hope to retain as much of the returns for the people of Manitoba and to pay as little as possible to other persons. This is good sound business sense and we appreciate the example of the private mining companies who have shown us the way.

The manner in which the policy of Manitoba has been implemented has been very simple:

- 1 We have stopped the automatic renewal of the mining leases and will not resume same until we are satisfied that the holders of the leases are not merely preserving their possession of same without engaging in any productive work.
- 2 We are engaging in a policy of taxation whereby Manitoba will not enter into an auction competition of giving tax concessions or incentives to match the highest bidder.
- 3 We are now investing exploration funds on behalf of the people on their own property in the hope of realizing the totality of the potential returns rather than the tax collector's share.

It would appear that for many years the provincial jurisdictions in Canada have been vying with one another for the purpose of trying to lure industrial mining development to their province. The result has been that the provinces have become the spokesmen for the mining interests in obtaining tax concessions and tax incentives from the federal government. For many years the annual Mines Ministers' Conference joined with the mining industry in asking for federal government concessions. Fortunately, this practice has been discontinued.

However, in my view this is not enough. What is needed is not a discontinuance of the former practice, but a complete reversal of the former practice. It is in the interests of the people that the federal government increase rather than decrease the taxation of mining companies and the provinces should then see to it that any implemented increases should be maintained with no province breaking ranks in the hope of luring development.

What then will be the answer to those who will hold up the scare of reduced activity, including exploration and producing mines? There is only one answer, that is for the province to commit themselves to continuing the level of productivity not by incentives but by public investment to pick up any threatened slack resulting from the implementation of a fair system of taxation. This strategy is being attempted to some extent in the province of Quebec and in the province of

Manitoba and in my view, is the only sensible strategy in the long run. The Manitoba Mineral Resources Limited is in its infancy and has a relatively small exploration budget. Its potential is, however, very great and is moreover, a vital counterpart to any policy of tax integrity on the part of the government with relation to the private mining sector.⁷

Meanwhile, the government had hired Eric Kierans to prepare a report on resource policy for the Planning and Priorities Committee of Cabinet. The Kierans Report was released by the Manitoba government in February 1973. A major recommendation was that, if the government wished to maximize returns to the people of Manitoba, it should repatriate all resources leased to the private sector within ten years. A number of short-term and long-term means for accomplishing this were suggested. Premier Schreyer and Mr.Green rejected the recommendations of the Kierans Report regarding government takeover of existing industry assets.

On 21 March 1974, Mr.Green presented a new policy statement to the legislature, based upon objectives of:

- i a fair return to the people of Manitoba as owners of the mineral resources;
- ii a fair return on investment to private sector companies;
- iii a fair share of any added value of minerals, unrelated to immediate production costs, to the people of Manitoba;
- iv a more active future governmental role in exploration, development, and processing of minerals;
- v jealous guarding of provincially-owned resources in order to participate in their development;
- vi conduct of activities by the private sector that would be more consistent with overall social and economic objectives of Manitoba, and disclosure of information to support this objective.

Mr.Green proposed leaving existing royalty rates at the same level, but reserved the authority to alter them later if a new tax based upon mineral price could not be implemented. To achieve the objective of a more active role in mineral exploration and development, Mr.Green proposed the formation of a government agency which would review any intended exploration and development by private companies, with the option to participate up to 50 percent in the program. He committed the government to maintaining the level of exploration, in the event of a

7. Sydney Green, 'Policy Statement' (*Saskatoon: CIMM Conference, 24 October 1972*).

reduction by private companies. Mr.Green also indicated there would be requirements for fuller disclosure of information by mining companies in Manitoba and, in the long run, more processing of minerals in the province.

POLICY AND ORGANIZATIONAL CHANGES AFTER 1974

The Metallic Minerals Royalty Act of 1975 and the 1974 Mineral Disposition Regulation (Manitoba Regulation 328/74) formed the two cornerstones of Manitoba's new mineral policy as described by Mr. Green. The former provided for a basic royalty of 15 percent of the profit base for a year, as well as an incremental royalty of 35 percent of any profit in excess of the profit base. The profit base was calculated as a proportion of a company's investment base.

The Mineral Disposition Regulation came into effect on 11 January 1975. Its major provisions were as follows -

- i The province had the option to participate up to 50 percent in any new mineral exploration in Manitoba. All exploration and development programs expected to cost more than \$10,000 a year would be affected.
- ii Prospectors whose programs were expected to cost less than \$10,000 would be eligible to receive a grant of up to 50 percent of the cost of an approved exploration and development program.
- iii A company was required to obtain a production lease before starting production from a mineral disposition, to run in ten-year terms. After a minimum of \$500,000 of exploration expenditures a company could apply for an 'explored area lease'.
- iv Mineral exploration permits were limited to between 24,600 and 115,200 acres. They were valid for three years, providing that at least one dollar an acre was spent on exploration during the first year, two dollars per acre in the second, and three dollars per acre in the third year.
- v Claim or claim block certificates were valid for five-year periods, subject to an expenditure of five dollars an acre for work within the claim for each of the second to tenth years and ten dollars per acre for each year thereafter.
- vi If the requirements in the regulations were not met, all interest of the holder in a mineral disposition would cease.

To implement and administer the new mineral policy, the Mineral Resources Division was created within the Department of Mines, Resour-

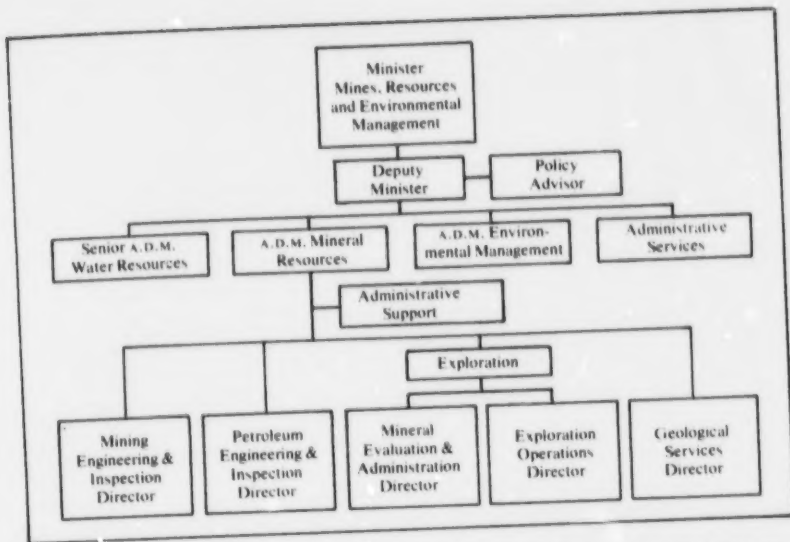


Figure 6. Organization chart of Department of Mines, Resources and Environmental Management

ces and Environmental Management in August 1974 (see figure 6). The organization and responsibilities of this division were outlined in the 1976 Annual Report of the department.

The Mineral Resources Division is responsible for the administration and management of the mineral resources within the province, with particular reference to the government policy of greater participation in mineral development to ensure a fair share of the return from this development.

The activities of the Division are carried out through five branches. The Geological Services Branch, Exploration Operations Branch, and Mineral Evaluation and Administration Branch are concerned with the collection, compilation and dissemination of information on mineral resources, disposition of Crown mineral rights, and participation in mineral exploration. The Mining Engineering

and Inspection Branch is responsible for administering regulations governing the operation of mines in Manitoba with specific emphasis on the safety and health of employees, and the Petroleum Branch is responsible for all matters related to the exploration, development and production of oil and natural gas.⁸

The Exploration Operations Branch (EOB) of the division was established to plan, coordinate, and implement the mineral exploration programs. It was involved directly and independently in exploration activities. Major activities to be undertaken by the branch included:

- i the selection of areas with economic mineral potential for new and follow-up departmental exploration ventures;
- ii the execution of geological, geophysical, and geochemical surveys for the location and evaluation of mineral deposits, for government exploitation or for stimulation of private sector activity;
- iii the implementation of diamond drilling programs to test such deposits;
- iv provision of a training program for prospectors as an aid in the search for new mineral deposits.

In March 1976, the Manitoba government signed a Subsidiary Agreement to the General Development Agreement (GDA) with the federal government. The EOB assumed responsibility for that part of the program which involved exploration for base metals and uranium. Actual exploration activities of the branch are discussed in chapter 8.

The Mineral Evaluation and Administration Branch of the Mineral Resources Division was divided into three sections, the Mineral Evaluation Section, the Mineral Economics Section, and the Mineral Administration Section. The Mineral Evaluation Section was designed to document and evaluate Manitoba's metallic and industrial mineral resources. The section's activities were funded under the Subsidiary Agreement of the GDA and the \$1.6 million joint federal/provincial Non-Renewable Resource Evaluation program. The latter covered evaluation studies on copper, zinc, and nickel; the Subsidiary Agreement covered studies of industrial minerals and evaluations of provincial gold and uranium deposits. A close liaison was maintained with the EOB, to assist in selection of areas for exploration and appraisal of findings.

The Mineral Administration Section (MAS) was responsible for the recording of mineral claims and collection of some rentals and royalties, as well as for administration of participation agreements under the Mineral Disposition Regulation. Between 1 January 1975 and 31 March 1977, the province entered into a total of sixty-three participation agreements

8. Manitoba, Mines Resources and Environmental Management, *Annual Report* (Winnipeg, March 1976), p. 31.

which resulted in exploration expenditures of over \$10 million. By the latter date, six agreements had terminated, six were inactive, and work was planned or in progress on the remaining fifty-one.⁹ Program administrators pointed out that the agreements were not subject to substantial negotiation, and furthermore that the government paid its share on a reimbursement basis rather than on a current expenses basis. The government's role was limited to monitoring compliance with the technical aspects of the regulation, and administering its participating interest.

Technical expertise in the monitoring and administration of participatory agreements was provided by the assessment group of the MAS. The funding policy of the government, as indicated in a letter from the deputy minister dated 6 February 1975, was: 'subject to budgetary constraints, to participate on a 50 percent refund of expenditure basis on all programs submitted.'

Subject to this policy, members of the assessment group also looked at each proposed program, and familiarized themselves with it. The assessment geologists dealt with individual proposals in varying degrees of depth. In some instances the assessment people had been involved with the company prior to the submission of the proposal; for example, visits to the site of exploration might occur when a company did not have a wealth of geological expertise.

The original joint venture agreement document (Appendix C to Regulation 328/74) formed part of the regulations which became effective in January 1975. The government resisted changes to the original document because the form of agreement was prescribed by regulation, and it wished to maintain consistency in administration. The agreement did, however, undergo one revision. Other minor amendments were made to accommodate specific requirements, generally on an individual basis. With the exception of changes dictated by specific circumstances, those written into the agreement for one company were incorporated in the standard agreement for all companies.

The Geological Services Branch of the Mineral Resources Division was responsible for the provision of geological mapping services for mineral appraisal and management. Its first full field season, in 1976, concentrated on geological belts judged to be economically favourable for mineralization, as well as on detailed studies of the characteristics of known ore deposits. The branch also provided laboratory services for use by geologists within the Mineral Resources Division.

9. *Ibid.*, 1977 p. 32.

Federal Government Policies

TAXATION

Following publication of the report of the Royal Commission on Taxation (Carter Commission) in 1967, the federal government released a proposal for tax reform, stating that it recognized that special rules were still needed to determine the taxable income of a mineral operator, but that the rules of the game should be less generous. In summary, the main aspects of the traditional tax system (see appendix I) had included a number of concessions designed to reduce the tax burden of the mineral industry, such as:

- i the first three years' income from a new mine was exempt from income tax;
- ii income from mining and processing of mineral ores up to the prime metal stage was reduced by 33 1/3 percent for the purpose of calculating taxable income (automatic depletion);
- iii mining assets (building, machinery, and equipment) were entitled to 30 percent capital cost allowance rate;
- iv exploration and development costs were deductible immediately, up to the amount of income.

The tax changes of the 1972, November 1974, and June 1975 budgets were discussed by G.R.Hjorleifson in 'A National Minerals Policy' as follows:

Bill C-259 was introduced on June 18, 1971 and came into force on January 1, 1972. The federal government's mining taxation policy was henceforth to be: 'continue tax incentives in order to recognize the risks involved in exploration and development, the international competition for capital and the level of incentives available in other countries while at the same time making really profitable projects subject to a reasonable level of taxation'. The main changes to the federal tax system as a result of Bill C-259 are summarized below:

- 1 termination of the three-year tax exempt period for new mines;
- 2 accelerated capital cost allowance for new mine assets or assets related to a major expansion in lieu of the three-year exemption;
- 3 a special resource abatement of 15 points of tax;
- 4 provincial mining taxes became nondeductible.

There has been considerable debate concerning the last provision. For many years the provinces of Canada had levied a mining tax on operating mines, in addition to the provincial share of the federal corporate income tax.

Bill C-259 clearly stated that provincial mining taxes were to be nondeductible and implied - by lack of definition - that royalties were to remain deductible in calculating federal tax returns. Inevitably, there were revisions of provincial views on royalties and rates and a marked movement upward; the rapid increase

in metal prices during 1973-74 further reinforced provincial views, resulting in revision to provincial mining tax rates in a number of provinces. . .

By the time of the May 1974 budget, higher provincial tax rates and royalties were of such an order of magnitude that, if the government had not imposed non-deductibility, its tax base from minerals and mining would have been effectively negated. As a result of the November 1974 and June 1975 budgets, the major features of the current federal income tax systems applicable to production income from mining are as follows:

- 1 a basic corporate tax rate of 46 percent with 10 points of abatement available;
- 2 a resource allowance deduction from income of 25 percent of resource production profits, calculated after operating expenses and capital cost allowance but before deduction of interest expenses, exploration, and development of earned depletion;
- 3 earned depletion allowance deduction of up to 25 percent of production profits will continue, and will be determined after the deduction of resource allowance, interest, and exploration and development expenses;
- 4 disallowance of provincial levies (royalties, taxes, etc.) continued, but the resource allowance (see above) recognized these levies and took them into account;
- 5 the special resource abatement of 15 percent was discontinued, resulting in a net federal tax rate of 36 percent, an increase from the previous rate of 25 percent;
- 6 a 5 percent credit against federal income tax for specified investments (buildings, machinery, and equipment acquired in Canada) between June 23, 1975 and July 1, 1977 as an encouragement to investment in Canada;
- 7 exploration expenses were deductible up to the amount of income, while development expenses could be amortized at a 30 percent rate;
- 8 accelerated writeoff provisions for new mine assets or assets that were in respect of a major expansion of an existing mine would continue.¹⁰

The net result of the changes in federal taxation of the mineral industry was a substantial decrease in the after-tax rate of return to companies in the mineral industry.

DEPARTMENT OF REGIONAL ECONOMIC EXPANSION (DREE)

The governments of Canada and Manitoba signed a General Development Agreement on 5 June 1974 for cooperation in initiatives for economic and socioeconomic development in Manitoba. Subsequently, the two governments entered into a subsidiary agreement for development of the Manitoba mineral industry.¹¹ The program was intended to realize this purpose by:

10. G. R. Hjørleifson, 'A National Minerals Policy', *Resources Policy*, vol. 2, no. 1 (Ottawa: Energy Mines and Resources, March 1976), pp. 40-42.

11. Canada, Regional Economic Expansion, *Subsidiary Agreement to the General Development Agreement on Mineral Exploration Development* (Ottawa, 31 March 1976).

- i further exploring mineral occurrences that are now submarginal, with a view to finding additional ore or improving grades so viable mining operations may be established;
- ii providing scientific and technical information that could lead to discoveries of deposits of copper, zinc, nickel, uranium, chromium, and industrial minerals;
- iii undertaking regional appraisal of mineral resources, and using this information to ensure that the maximum benefit accrues to the people of Manitoba in general and to northern residents in particular, from all future mineral developments in the area.

The following projects were included:

- i base metal exploration;
- ii uranium reconnaissance exploration;
- iii regional survey and evaluation;
- iv pegmatite mineral exploration;
- v mineral development analyses.

The estimated cost of the Canada-Manitoba Subsidiary Agreement on Mineral Exploration and Development was \$8.5 million. The costs were to be shared on a 50/50 basis by the provincial and federal governments (table 6).

Table 6

Estimated Cost of Projects Under the DREE-Manitoba Subsidiary Agreement on Mineral Exploration Development, 1976
(\$ Million)

Project	Provincial Share	Federal Share	Total
Base metal exploration	2.0	2.0	4.0
Uranium reconnaissance exploration	0.8	0.8	1.6
Regional survey and evaluation	0.3	0.3	0.6
Industrial minerals evaluation	0.75	0.75	1.5
Pegmatite mineral exploration	0.2	0.2	0.4
Mineral development analyses	0.2	0.2	0.4
Total	4.25	4.25	8.5

Source: Canada, Department of Regional Economic Expansion, *Subsidiary Agreement to the General Development Agreement on Mineral Exploration Development* (Ottawa: 31 March 1976).

3. Sherritt Gordon Mines Limited

Background

Sherritt Gordon's operations in Manitoba began with the purchase of a portion of the original copper producing property at Sherridon, Manitoba, by Messrs. Sherritt and Madole in the early 1920s. In 1927 a group of developers acquired options on 58 claims in the area and Sherritt Gordon Mines Limited was incorporated to operate the property.

The company's activities at Sherridon were constrained by depressed copper prices and limited ore reserves. The Sherridon mine operated briefly in 1931, suspended activities from 1932 to 1936, and resumed operations from 1937 to 1951. By this time, all known reserves were exhausted and the company began transferring its plant and concentrator to Lynn Lake.

Sherritt Gordon's interest in the Lynn Lake area began as early as 1937 when it undertook extensive exploration in that area. The first indication of nickel-copper occurrences was in 1941. However, because exploration and development was curtailed during World War II, it was not until 1945 that the area containing most of the known favorable rock occurrences was discovered and developed. Production at Lynn Lake commenced November 7, 1953. In 1954 the refinery at Fort Saskatchewan, a few miles from Edmonton, Alberta, went into production.¹

The mine at Lynn Lake was closed in 1976, leaving Sherritt Gordon with two copper-zinc mining properties: the Fox Lake Mine, discovered in 1961; and the Ruttan Mine, discovered in 1969. The concentrates from the two producing Sherritt Gordon mines were refined in Japan and at Noranda facilities in Quebec. When the Farley Mine at Lynn Lake was closed in June 1976 the milling facilities were 'moth-balled.'

In addition to the facilities in Manitoba, Sherritt Gordon operated a complex at Fort Saskatchewan, Alberta, which included a nickel and cobalt refinery, nitrogen and phosphate fertilizer plants, metal fabricating plants, and research and development facilities.

Sherritt has concentrated its exploration in Manitoba, particularly in the Lynn Lake area (table 7). Other areas of interest have included Saskatchewan and, in the mid-1970s, northwestern Ontario.

1. Manitoba, *Report of the Task Force on Manitoba Minerals Policy* (Winnipeg, March 1974), pp. 77-78.

Table 7

Sherritt Gordon Exploration Expenditures, 1967-77
(Dollars)

	Expenditure
1967	247,908
1968	419,204
1969	488,741
1970	620,000
1971	821,930
1972	688,276
1973	798,269
1974	1,349,200
1975	1,072,000
1976	783,600
1977	{ 655,000 + 185,000

Source: Sherritt Gordon company records.

The first case discussed in this chapter deals with exploration leading to the discovery of the Ruttan Mine, prior to the mineral policy changes. The second deals with actions during the period of policy changes, and with the Counsel Lake exploration project after the changes were in effect.

Ruttan Lake Project

RECONNAISSANCE

In 1956 Sherritt Gordon obtained its first airborne geophysical equipment, a magnetometer with an automatic recorder, and began exploration of the areas around Lynn Lake and Lake Winnipeg, and in the Northwest Territories. The adoption of airborne equipment effectively marked the end of the prospector era for the company, although one prospector was kept in the field until 1958.

In 1959 Sherritt Gordon conducted an aerial survey of the Rusty Lake area (figure 7) in northern Manitoba as part of its base metal exploration program. The choice of the area was based on the exploration philosophy of Sherritt management, and particularly on the advice of Doug Ruttan, the firm's manager of exploration and geology, who preferred to concentrate on detailed work in areas which had been selected on the basis of their favourable geological and geophysical characteristics.

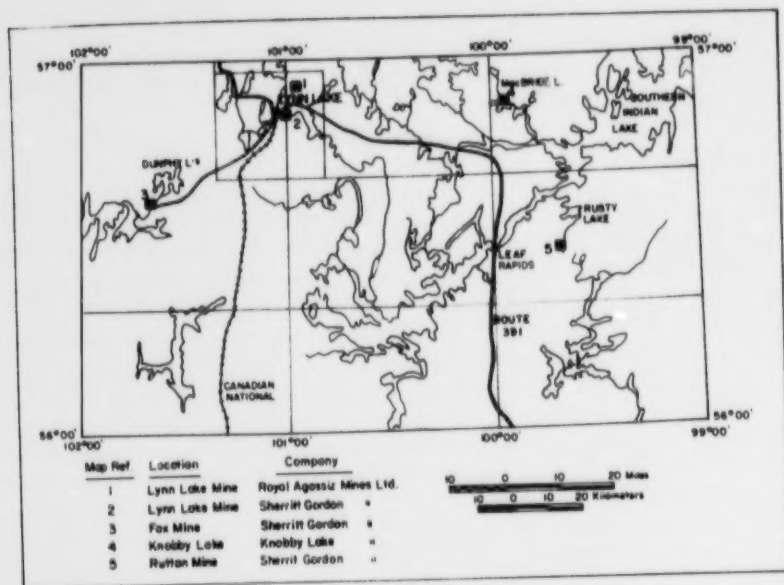


Figure 7. Mines and mining properties, Lynn Lake area

Source: *Report of the Task Force on Manitoba Minerals Policy*, March 1974, p. 81.

Knowledge of the Rusty Lake area had previously been obtained from surveys flown by Inco and Hudson Bay Exploration and Development (HBED). Sherritt did not follow up the 1959 airborne survey with any ground acquisition or exploration at that time. This decision, made by Doug Ruttan, was based on the fact that HBED was already doing extensive work in the area.

In 1960 Sherritt Gordon acquired an airborne electromagnetic unit, and was carrying out surveys near Lynn Lake when the Fox Lake copper-zinc ore body was discovered in the area. Copper-zinc mineralization was also found some ten miles west of Fox Lake. Exploration then focused on this area, rather than farther afield at Rusty Lake.

GROUND FOLLOW-UP

The Rusty Lake area again became interesting to the company following commencement of construction of highway 391. In 1966 Ruttan decided to explore along the route of the new road. The area was reflown by Sherritt in July 1968, using new airborne equipment built and designed by George McLaughlin of Newmont Exploration. The findings were reviewed by Ruttan, Paul Pawliw, a geophysicist, and Joop Langelaar, chief explora-

tion geologist, and as a result, ground was acquired. Six claims, known as the Karl claims, were staked at Ruttan Lake and later the Dar claims were staked some six miles south of Ruttan Lake.

Between 28 July and 7 August 1968, geophysical crews conducted ground surveys on the Ruttan Lake anomaly, but there was no further work done in the Ruttan Lake-Darrol Lake area in that year. The company had commitments on ground in Saskatchewan, and at the time it would not have been economic to move a drill to test one anomaly only. It was decided not to carry out a drilling program on the newly-acquired ground until equipment, crews, and exploration funds were available.

In the fall of 1968 the Manitoba government, through Manitoba Hydro, decided to conduct an airborne survey of the South Indian Lake area. This decision was a result of a proposal to flood the area for a hydroelectric project; the government wished to insure that no significant unexplored mineral anomalies were being overlooked in the proposed flood region. The survey was flown by Questor Surveys in October and November 1968, and confirmed the Ruttan Lake anomaly, as well as many others in the Rusty Lake area.

In early 1969 Sherritt staked additional ground in the Rusty Lake area, because of favourable information from the Manitoba Hydro survey and from earlier survey work done by Sherritt. The main reason for acquiring more ground in this general area was to establish a position in the event of a confrontation over land held in the proposed flood area at South Indian Lake.

DIAMOND DRILLING

In February and March of 1969, ground geophysical work was continued in the Rusty Lake area to outline targets for diamond drilling. Toward the end of March 1969, one diamond drill was moved into the Ruttan Lake area. The first drill hole was started on 3 April on a high priority anomaly. By 4 April, 195 feet had been drilled, returning a 136-foot horizontal width of 1.13 percent copper and 0.15 percent zinc. The core was brought to Lynn Lake for examination, and generated great excitement. A plan for additional ground acquisition was completed the next day, and the staking of ground assigned the highest priority began immediately. Within three days, a staking crew of a dozen men had been mobilized. When rumours of the Sherritt discovery began to spread, three or four days after the find, the company was anxious to tie up all the ground it could, knowing a staking rush would occur. By 15 April Sherritt had acquired some 30,000-40,000 acres in the Ruttan Lake area.

Diamond drilling continued on the anomaly and, by the end of May, 10,700 feet had been completed by two drilling crews. The second drill had arrived shortly after the discovery; in June, a third drill was added,

and in July a fourth began work. By the end of July, over 29,000 feet had been drilled. Things were extremely hectic.

At approximately the same time, calculations of the economic feasibility of the project were begun.

DEVELOPMENT DRILLING

After completion of the ninth drill hole in early May, the Ruttan project was taken off the exploration budget and a special Ruttan project fund was set up. A draftsman was hired to plot the drill holes, a core library was begun, and ore reserve calculations were in progress. The frenzied pace was maintained throughout the last five months of 1969. In December there were seven diamond drilling crews on the anomaly. Even though machine breakdowns were frequent, and December saw a Christmas break for all but one drill crew, 68,900 feet of drilling had been completed by the end of the year. The engineering department was by now involved in the Ruttan project. Over one hundred holes had been drilled, giving a rather detailed picture of the ore reserve. Feasibility studies were conducted to calculate the viability of a mining operation, and included designs for methods of mining the ore.

The work on the anomaly was becoming more routine by early 1970, and involved drilling, equipment maintenance, logging core, calculating ore reserves, completing assays, sampling, and planning for mine development. Over 86,300 feet of drilling in 130 holes was completed by the end of February. The camp at Ruttan Lake had grown to over seventy people, including drilling crews, geologists, and cooks. The problems of rapid growth were obvious in the camp: tent walls were cut out to complete additions for living quarters, and the garbage dump was continually relocated to prevent it from ending up in the middle of the camp.

In March 1970, with over 100,000 feet of drilling completed, responsibility for the Ruttan Lake project was transferred to the mining department. The decision, made by management in Manitoba, was a matter of routine, as the work of the exploration department had been completed to the point of outlining proven and potential reserves. The company's annual report of 1970 indicated reserves of 51 million tons of ore at 1.47 percent copper and 1.61 percent zinc. The same month, the stripping of overburden began in three pits to expose ore for a pilot mill sample.

Counsel Lake Project

The exploration department, with a sizeable new budget following the Ruttan Lake discovery, began a new program of outside exploration. The majority of work in 1970 was in four regions:

- 1 within a 90-mile radius east of Ruttan Lake;

- ii God's River area, 100 miles southeast of Gillam;
- iii northern Ontario;
- iv northwestern Ontario.

At this time, exploration policy was being established in Lynn Lake. However, the expanded exploration authorized by the head office budget was a significant factor in determining the amount and type of work to be done. For example, a prospect in northern Ontario was considered 'very hot' by the company geophysicist, on the basis of surveys flown in the area. The company was prepared to spend up to one-third of its annual budget on 'grassroots' projects such as this one, or in new geological regions such as the God's River area.

Exploration programs in the same four areas were conducted in 1971 and 1972, in a sequence of airborne geophysical surveying, ground geophysics, ground reconnaissance, and diamond drilling. Some ground geophysical work was also carried out on properties in Alberta and British Columbia in 1972.

In 1973, airborne surveys were flown in northwestern Ontario and in the Lynn Lake area of Manitoba, as well as in the Flin Flon and Sherridon areas. Claims were staked in both northwestern Ontario and Manitoba. A 'fine-toothed comb' approach was proposed by Langelaar for the area between the Fox Lake Mine and Lynn Lake, where the company held forty-four claims. With reserves of ore in the Lynn Lake mines nearing depletion, Langelaar argued that it seemed logical to examine their own backyard thoroughly. This approach was not adopted at the time, because of budget limitations and because of ongoing discussions regarding changes in the Manitoba Mines Act. Diamond drilling was under way in both Manitoba and northwestern Ontario.

CONCENTRATION IN ONTARIO

The interest of Sherritt Gordon in northwestern Ontario increased during 1973 and 1974. The company had become actively interested in the area in 1970, mainly because of the geology of the region, the available infrastructure, and the fact that the area was well known to Ruttan, who had been a geologist in the Red Lake area prior to 1950. A field office was established in Dryden in early 1974, and in that year Ontario activity accounted for: 90 percent of the diamond drilling; 75 to 80 percent of airborne reconnaissance (Pickle Lake, Dryden, and Kenora areas); 85 percent of ground geophysics (Red Lake and Fort Frances areas); and 645 claims, (versus 101 claims in Manitoba).

Activity in Manitoba continued in the Lynn Lake-Sherridon area (diamond drilling) and the Flin Flon area (ground geophysics). 1974 was the peak year for company exploration.

During the second half of 1974, Sherritt Gordon representatives met with officials of the Manitoba government in Winnipeg to discuss pending legislation. Many meetings were held: with the Manitoba Mining Association; with Sidney Green, the minister of Mines, Resources and Environmental Management (MREM); and with representatives from industry.

WITHDRAWAL FROM MANITOBA

The new mining legislation became effective 1 January 1975, and in February 1975 the company president, David Thomas, decided to cease all exploration activity in Manitoba. He stated in the report to shareholders for the first quarter of 1975:

The Manitoba Government, as part of its overall mineral policy, brought in new mineral disposition regulations which, among many other troublesome things, provided for the Government's participation in all new mineral exploration up to 50 percent. As I am one of the industry leaders who has advocated joint ventures with government, it is somewhat embarrassing for me to tell you today that, because of these regulations, Sherritt has stopped exploring in Manitoba. The joint venture arrangements which have been proposed to date by the Manitoba Government are commercially unacceptable to your company. We have been proud and jealous of our knowledge and expertise in the field of exploration, which warrants recognition in any Canadian exploration arrangement. We are prepared to waive this recognition in dealing with the Manitoba Government but we are not prepared to bear more than half the cost in order to retain a 50 percent interest in any property. Most of our exploration is now taking place in Ontario, where our crews have been instructed to find only 'small' mines.

All exploration activity centred in Ontario, and Langelaar moved to the Dryden office to direct it. Paul Pawliw remained in Lynn Lake assessing previous work from the Fox Lake area with an exploration staff of only eight people. Doug Ruttan retired as manager of exploration and geology in the fall of 1975, and Joop Langelaar assumed responsibility for outside exploration.

Sherritt Gordon staked only one claim block in Manitoba in 1975, in an area between Fox Lake and Lynn Lake. For most of 1976, Sherritt's policy of no exploration in Manitoba prevailed. All airborne reconnaissance and diamond drilling was carried out in Ontario through the first ten months of the year.

CHANGES IN MANITOBA

In November and December of 1975, Dr. F.J. Elbers, director of the Mineral Evaluation and Administration Branch of MREM, met with Jim MacLellan (Sherritt's new general manager for the Manitoba region), Joop Langelaar, and others at Lynn Lake to discuss a proposed revision of mapping for the area. No specific proposals were presented at this

meeting, but in subsequent discussions Sherritt proposed two possible avenues by which the company could become involved: Sherritt could buy the results for \$25,000 and therefore have exclusive rights to the survey information; or, the results could be released on an open file and Sherritt could utilize them along with any other interested parties.

The Manitoba government eventually carried out the airborne survey on its own and released the results on open file on 22 June 1976. Mr. Langelaar observed that previous company efforts had already identified 95 percent of the anomalies indicated by the government survey.

Early in the summer of 1976, the Farley mine in Lynn Lake closed, and the mill in Lynn Lake was 'moth-balled.' The population of the town of Lynn Lake decreased accordingly. At this time, management decided to assess the need to resume exploration in Manitoba in order to increase ore resources so processing operations could be maintained. Management in Manitoba took the initiative in pushing for the assessment.

There was no indication, up to and including the time the government survey results were released, that top management would change the policy of no exploration in Manitoba, and there was no softening of the company's official position. Prior to the release of the government survey results, Sherritt Gordon had staked a total of 124 claims in the area covered by the survey. The selection was based on survey information gathered previously. On 22 June, thirty-five additional claims were staked in the Lynn Lake area on the basis of data from the Questor survey. There was no intention on the part of Manitoba management, who had initiated the staking, to proceed with further work before a change in policy from head office.

In July 1976, an exploration program encompassing the area within a forty-mile radius of Lynn Lake was developed by the exploration department. It was designed to eliminate all barren anomalies, and to identify any and all potential ore bodies within the zone. Factors leading to development of this program, initiated by Mr. MacLellan, and undertaken by Paul Pawliw were:

- i the availability of a shutdown concentrator, a townsite, and a work force in Lynn Lake, which would make development of smaller ore bodies in the immediate vicinity economically viable;
- ii the probability of relatively small ore deposits in the favourable geological zone where two mines had been developed;
- iii the need for ore to maintain the townsite at Lynn Lake;
- iv the government would finance 50 percent of exploration expenditures, and in addition there was a feeling that the government and the company could work together.

These factors took precedence over the basic disagreement with mandatory government participation. Official company policy was changed in August 1976. The exploration department was authorized to stake ground in Manitoba but not to do any other exploration work.

RESUMPTION OF MANITOBA ACTIVITY

One of the targets for further investigation in the program outlined by Pawliw was near Counsel Lake. This anomaly was identified as a direct result of the release of the government's Questor survey data. The 1972 and 1973 airborne surveys flown over the area by Sherritt Gordon had been conducted with flight-line spacings of one-quarter of a mile, as opposed to the Questor flight-line spacing of one-eighth of a mile. The difference in spacing accounted for the fact that the Counsel Lake anomaly was evident on the Questor survey and very weak on those flown earlier by Sherritt Gordon.

The Counsel Lake anomaly was one of the nine high-priority anomalies which formed the program of joint venture no. 1, submitted to the government in September 1976. The submission required extensive detailing by Sherritt Gordon, with greater detail of actual work to be performed on each project, and more definite cost estimates of each phase of the project, than had been necessary for previous exploration planning undertaken entirely by the company. An estimate of costs was made for each claim block under major categories of: geological reconnaissance; line cutting and ground geophysics; geological mapping; office compilation and interpretation; and drilling. These major categories were further subdivided into a number of more detailed categories. The accounting techniques used by the company also required revision to conform to the joint venture proposals. The actual agreement between Sherritt Gordon and the government was subject to a number of changes over a period of time. Joint venture agreement no. 1 was finally signed in the late spring of 1977, and was retroactive to 1 August 1976.

COUNSEL LAKE ACTIVITY

Ground reconnaissance began before the government had acknowledged receipt of the joint venture proposal. Ground geophysical surveys on three of the properties outlined began in mid-October 1976. Geophysical work was conducted and survey results were compiled on the Counsel Lake anomaly in December. Diamond drilling began on the property late in February 1977. The first drill hole intersected 3.65 percent copper and 0.33 percent zinc in a 16.5-foot core length. Once these results had been confirmed at the Lynn Lake office, a staking program was undertaken. Frantic staking took place in the general Counsel Lake area, as well as in other areas along the same geological horizon. By the end of February,

more than 15,000 acres had been staked as a result of the showing at Counsel Lake. Since rumours of the showing spread rapidly, Sherritt was anxious to protect as much ground as possible.

In response to a request from Sherritt, the initial cost of joint venture no. 1 (\$260,000) was increased by \$183,000, to permit more geophysical work and drilling. The initial program for Counsel Lake had included only \$20,000 for diamond drilling. Drilling began in early March and was carried on until the end of May. Although fourteen holes were drilled, no positive results were found after the first.

By the end of April, Langelaar and Pawliw had decided to abandon the Counsel Lake project. It was also decided to defer work indefinitely on the properties that had been acquired as a result of the initial Counsel Lake showing. The project officially ended on 30 June 1977, as specified in the agreement, and a summary report of work done on all programs in the joint venture was submitted to the government.

Subsequent Developments

After the first venture, Sherritt Gordon dealt with the government on a number of other agreements and the procedure became more routine. Unit costs of various activities were calculated, and estimates were made of time required for each. The figures were 'plugged' into the appropriate slot on the form; the total estimates and a letter were then submitted to the government. Copies of the letter went to Mr. MacLellan and to head office in Toronto. The agreements were drawn up by the Mineral Administration Section of MREM and forwarded to Toronto, where the final negotiations were handled by the company's legal advisor.

4. Hudson Bay Mining and Smelting Company Limited

Background

The nucleus of the HBM&S copper-zinc property in northern Manitoba was staked in 1915 by Thomas Creighton for the Hammond Moshu Syndicate. The property was optioned to a succession of interests in the next few years but reverted to the original owners in 1920. In 1925 an option was arranged with the Whitney Groups of New York. In 1927 Flin Flon Mines Limited was incorporated to operate the property and Hudson Bay Mining and Smelting Company Limited was established as a holding company.¹

The development of the mine and construction of the concentrator, zinc recovery plant, and copper smelter, as well as the hydroelectric plant at Island Falls, Saskatchewan, started in 1928 and operation of the mine commenced in the latter part of 1930.

Hudson Bay Mining and Smelting (HBM&S) was centred in and around the Flin Flon-Snow Lake area until the mid-1960s. Soon after effective control of the company was acquired by Anglo American Corporation of Canada in 1962, there was a move by HBM&S into other industries such as the Zinc Oxide Company of Canada and its wholly owned subsidiary, Durham Industries in 1965, with a product line including zinc dust and zinc oxide for paint, paper, and chemicals. Hudson Bay Diecasting Limited was also established in 1965 as a wholly-owned subsidiary, to manufacture zinc diecastings. In 1966, HBM&S moved into the natural gas and oil industry by acquiring controlling interest in Francana Oil and Gas Limited. In 1968 the company acquired all property and assets of Sylvite of Canada Limited, a potash property in Saskatchewan, and a 60 percent interest in Francana Minerals Limited, formed in 1967 to develop sodium sulphate deposits in Saskatchewan.

Hudson Bay Mining and Smelting's base metal processing operations were located in Flin Flon. Ore from its ten base metal mines in the Flin Flon and Snow Lake area was transported by truck and rail to Flin Flon for processing.

1. Manitoba, *Report of the Task Force on Manitoba Minerals Policy* (Winnipeg, March 1974), pp. 77-78.

Hudson Bay Exploration and Development (HBED), the exploration arm of the company, was active in exploration in Manitoba, Saskatchewan, the Yukon, Quebec, Ontario, and British Columbia. The peak period for exploration expenditure by the company was in 1974 when \$2.9 million was committed (table 8).

The first case in this chapter outlines Hudson Bay Exploration and Development's Rusty Lake exploration program in the period prior to change in the Manitoba mineral policy. The second case outlines the decision to cut back exploration in Manitoba in 1975 and the subsequent resumption of exploration, and centres on the End-Jit exploration program. These cases, like the Sherritt Gordon cases, illustrate the temporary shift in the source of company exploration decisions, from local to head office, that occurred following the Manitoba policy changes of early 1975.

Rusty Lake Project

In the late 1940s, Hudson Bay Exploration and Development concentrated its exploration in Manitoba and the adjacent Saskatchewan area, with some additional prospecting in the Yukon and Northwest Territories. About this time, two events precipitated an active and comprehensive exploration program in the Flin Flon and Snow Lake areas. The technology was evolving, and equipment for geophysical surveys utilizing electromagnet fields to locate sulphide bodies had become available; coinciding with this was the discovery that the original mine at Flin Flon would 'bottom out' at 3750 feet.

The new geophysical techniques and concentrated searches in the Flin Flon-Snow Lake area (figure 8) produced some new mines in the early fifties (Flexar and Coronation). The company continued to move outward from Flin Flon in a semi-circular pattern to the north. By the mid-1950s, exploration had spread as far afield as Snow Lake in Manitoba, and Hanson Lake in Saskatchewan, about seventy-five miles from Flin Flon. Two new mines, Stall and Chisel, were found in the area by ground geophysics, and indirectly resulted in the Ghost Lake discovery, by geological extrapolation. The equipment utilized in ground geophysics had proven itself to be effective in finding ore bodies.

THE EXPLORATION DEPARTMENT

HBED was a rather close-knit group during the late 1950s and early 1960s, with offices in the main building of Hudson Bay Mining and Smelting in Flin Flon. Exploration decisions were, for the most part, made independently of HBM&S management, although monthly reports of activities and annual budgets were submitted. Once budgets were approved, Albert

Table 8

Hudson Bay Exploration and Development Exploration Expenditures in Manitoba and Saskatchewan, 1950-76
(\$Thousand)

	Expenditure
1950	562
1951	767
1952	1,442
1953	1,848
1954	1,962
1955	1,949
1956	2,215
1957	1,838
1958	1,038
1959	1,105 ^a
1960	1,147 ^a
1961	1,121 ^a
1962	1,165 ^a
1963	1,088 ^a
1964	1,218 ^a
1965	1,267 ^a
1966	1,551 ^a
1967	1,315
1968	1,500
1969	1,775
1970	1,800
1971	2,250
1972	2,250
1973	2,250
1974	2,934
1975	1,300
1976	809
Total	41,446

Source: *Hudson Bay Exploration and Development company records.*

^aIncludes Yukon figures.

Koffman, as chief geologist, operated independently. Programs of a major nature such as that at Rusty Lake were presented to the HBM&S management for specific approval, but for all intents and purposes the approval was of a 'rubber stamp' nature.

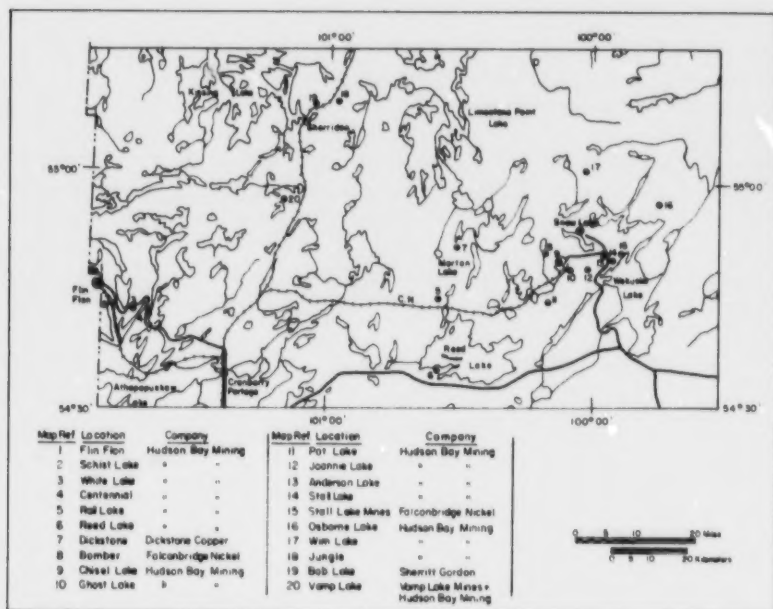


Figure 8. Mines and mining properties, Snow Lake-Flin Flon-Sherridon area
Source: Report of the Task Force on Manitoba Minerals Policy, March 1974, p. 74.

Management of HBED included Koffman, Ron Price (senior geologist), Gordon Bragg (diamond drilling supervisor), and P.J.Deveaux (on-site geologist, Rusty Lake project), and interacted rather informally. Koffman relied on the members of his department for input into exploration decisions. Essentially, area selection decisions were made by two men, Koffman and Price. Once a decision was made, the exploration cycle of airborne survey, ground acquisition, line cutting for ground geophysical surveys, geophysical surveys, and diamond drilling of anomalies was initiated. Some influence was exerted by W.A.Green, the executive vice-president of the company, who was located in New York, and by E.Austin, general manager, HBM&S, at Flin Flon. Mr.Green's interest was a result of his long term as general manager of HBM&S at Flin Flon.

RUSTY LAKE ACTIVITY

By the end of the 1950s, HBED exploration had moved as far afield as the Rusty Lake area in a large greenstone belt some 150 miles northeast of Flin Flon. The Rusty Lake area was chosen by the geological group for a number of reasons, including:

- i favourable geology (greenstone volcanic rock);
- ii areas closer to Flin Flon had been surveyed and tested;
- iii the greenstone belt was a good size and had not been flown by anyone else;
- iv the size of the greenstone belt was important. The company was looking for a major deposit, since the nearest railway was fifty-five miles away, at Lynn Lake;
- v sulphide showings had been found in the area.

The decision to conduct an airborne survey was made by Koffman and Price. The actual survey area was selected on the basis of information in geological maps available from government sources, outlining the Rusty Lake greenstone belt. The survey was carried out in 1959, covering 985 line miles. At the end of 1959, ground was staked and geophysical surveys and diamond drilling commenced. More airborne surveying was carried out to the south in 1960, covering a total of 1944 line miles. Some 298 individual claims were staked, and extensive follow-up work was carried out in 1960. Two hundred and ninety-eight miles of electromagnetic survey and 24,543 feet of diamond drilling on 115 conductors were completed.

The results of the program were not encouraging. A few holes showed low copper-zinc values, but most holes showed no values, and no economic grades of mineralization were realized. Nevertheless, plans were made to carry out further geophysical ground surveys and diamond drilling the next year.

Extensive exploration was conducted in 1961 in the Rusty Lake area, but with no more success than in the previous year. Four hundred and twenty-four line miles of geophysical survey work were completed, and 16,257 feet of diamond drilling was carried out. Although no encouraging mineralization was encountered, diamond drilling of conductors identified in 1961 was to be completed in 1962.

However, 1962 saw a change in plans. No work was carried out in the Rusty Lake area, and approximately 80 percent of the HBED budget was spent in the Manitoba-Saskatchewan border area. Reasons for dropping Rusty Lake included:

- i over 40,000 feet of drilling with no significant results;
- ii \$350,000 spent over two years;

- iii company top management, not the exploration people, had become tired of the project and made an overriding decision to abandon it. Continuation of the program, no matter how interesting to the geologists, couldn't be sold by Koffman to head office management.

Unfortunately, HBED had missed flying over the Ruttan anomaly in 1959 by only a few miles, because the map they had used to select the survey area did not show it as part of the greenstone belt. A geological map published by the province of Manitoba in 1964 showed the anomaly correctly located in the greenstone formation, and in 1969 Sherritt Gordon Mines found the Ruttan ore deposit on the periphery of the area flown previously by HBED.

End-Jit Claims

HBED searched for base metals on the End-Jit claims program in the Lynn Lake area from 1969 to 1974. The work completed in the area was as follows:

- 1969 5,098 miles airborne electromagnetic (EM) survey
90 miles horizontal loop ground EM survey
- 1970 2,511 miles airborne EM survey
555 miles horizontal loop ground EM survey
43 diamond drill holes totalling 11,326 feet
- 1971 61 miles horizontal loop ground EM survey
132 diamond drill holes totalling 34,129 feet
- 1972 4,719 miles airborne EM survey
184 miles horizontal loop ground EM survey
60 diamond drill holes totalling 34,129 feet
- 1973 747 miles horizontal loop ground EM survey
1 diamond drill hole totalling 176 feet
- 1974 173 miles horizontal loop ground EM survey
22 diamond drill holes totalling 6,008 feet

CUTBACK IN MANITOBA

The End-Jit program was deferred indefinitely in late 1974, prior to completion of drilling of all the identified targets. The decision to leave the area resulted from political, budgetary, geological, and technological factors. Attention became focused upon the limestone-dolomite covered areas south of Flin Flon, utilizing the company's new EM airborne survey equipment. The Freebeth copper-zinc discovery at Reed Lake, which had been found under a shallow dolomite cover, contributed to the company's shift of attention to this area.

In October 1974 Mr.H.McKenzie, HBM&S president, announced to a meeting of financial analysts in Winnipeg the decision to cease all ground acquisition in Manitoba. There had been no discussion with the Flin Flon personnel prior to this decision, although they had been apprehensive about their planned future programs in Manitoba because of public and in-house statements made by senior HBM&S officials.

The budget for 1975 was cut by 50 percent, and work in Manitoba was mainly confined to ongoing projects or optioned properties. In 1976 work was largely restricted to land held under order-in-council leases. The reduction of exploration in Manitoba was a result of changes in Manitoba legislation affecting the mining industry, in particular the new Mineral Disposition Regulation with its participation option.

During the period from October 1974 to September 1976, ground holdings were allowed to lapse selectively, as the budget for exploration was reduced. The decisions regarding which pieces of ground were expendable were made in Flin Flon by Bill Burbidge, property manager, by Ted Baumgartner, senior exploration geologist, and by Gordon Bragg, the district exploration manager.

EXPLORATION AGREEMENTS ON ONGOING PROJECTS

In August 1975, following a considerable amount of discussion and negotiation, the company signed joint agreements with the Manitoba government covering ten exploration projects already in progress.

Even before the regulations providing for joint projects came into effect in January 1975, HBED, along with other mining and exploration companies, had made representations to Mr.Green, the minister of Mines, Resources and Environmental Management, Mr.Cawley, the deputy minister, and other senior members of the department, including Dr.Ian Haugh and Mr.J.Roper. These representations followed publication of the Kierans Report in February 1973, when it became apparent that major changes were being contemplated. The volumetric tax proposed in Finance Minister Cherniak's budget of March 1974, the report of the Task Force on Manitoba Minerals Policy published on 14 March, and Mr.Green's statement of 21 March 1974, provided further indications of imminent changes.

In the last six months of 1974, after release of a draft of the proposed new regulations, including the wording of a standard joint venture agreement, Bragg and Burbidge attempted to effect changes in the proposal. HBED was particularly concerned about economic viability, management fee percentages, compulsory participation, discretionary powers of the minister, allowable charges to joint ventures, invoicing methods, and lack of flexibility in basic formal agreements. A meeting was held in Flin Flon at Mr.Cawley's request in July 1974, and representations were made on

behalf of HBED. Bragg and Burbidge also made representations through the Mining Association of Manitoba and the Prospectors and Developers Association in the latter months of 1974. However, only minor changes were made and the new regulations came into effect in January 1975.

From January to August 1975, several meetings were held between HBED and the government in Winnipeg, to discuss details of the agreements for the ten projects. One meeting in March 1975 was attended by Bragg, Burbidge, and Cairns. Another, in July was attended by Bragg, Cairns, and Blair Howkins, who at that time was vice-president of exploration. Some minor changes were made, and the initial ten agreements were signed by the company, under protest, in August 1975.

RENEWAL OF ACTIVITY

In early 1976, the company was aware that the Manitoba government was planning an airborne survey in the Lynn Lake area. In anticipation of the release of the survey results, as well as of a change in the policy on ground acquisition in Manitoba, Gordon Bragg decided to re-evaluate earlier airborne work done by HBED in the area. A group consisting of Mike Chorney (supervisor of ground geophysics), Ted Baumgartner, and Aage Olesen (field coordinator) carried out the re-evaluation from January to March. The main purpose was to locate untested electromagnetic anomalies which were on 'open ground' and had favourable geological environments. They were able to identify a number of interesting targets. At this time, there was still a negative response from Toronto to proposals for staking new ground in Manitoba.

A ground acquisition policy, developed in March 1976 at the corporate level, allowed ground to be acquired on an *ad hoc* basis. The exploration vice-president, Bob Cairns, would consider recommendations from Gordon Bragg on acquisition of specific pieces of ground. The autonomy of the district exploration manager was reduced considerably during this period. Decisions which Bragg had been able to make previously, such as ground acquisition, now had to be authorized by head office in Toronto.

In late March 1976 the first ground acquisition was made under the *ad hoc* policy. The acquisition was in northwestern Manitoba, and followed the release of results of a joint federal and provincial uranium reconnaissance program.

On 14 June 1976, Cairns telephoned Bragg to discuss proposed ground acquisitions in the Lynn Lake area, in view of the fact that the Manitoba Government's Questor INPUT survey data was to be released in two weeks' time. Bragg indicated to Cairns that 80 percent of the area had already been flown by HBED and that, judging by results to date, further work did not appear warranted. On 21 June Cairns called Bragg again and was advised that staking of six small claim blocks would cover known

unstaked electromagnetic anomalies in the area. The next day Bragg received permission to go ahead with staking from the management committee in Toronto. This was also the day of the release of the Questor data, which indicated that additional ground would be required to cover the cluster of anomalies which HBED wished to acquire. The exploration group in Flin Flon had to scramble to complete plans. A staking crew which was at Lynn Lake on the day of the release was given the necessary information by telephone and were in the field that afternoon and staking by next morning. The company staked one claim and thirteen claim blocks, a total of 4,438 acres, including most of the ground they had hoped to obtain. These claims became known as the End claims.

In September 1976, three months after the activity created by the survey data release, the next move in reactivating general exploration was made by exploration vice-president Bob Cairns, in response to a request for a ruling by Gordon Bragg concerning expenditures required to hold claims in the Flin Flon area. The decision, made by Cairns, in consultation with W.A. Morrice, president of HBM&S (McKenzie resigned 1 January 1976), was to spend \$130,000 to hold claims around Flin Flon which were due to lapse. From this time on, ground acquisition decisions were made in Flin Flon by the district exploration manager.

END CLAIMS AGREEMENT AND FIELD ACTIVITY

The agreement signed 15 November 1976 for the End claims was the same as the previous agreement, negotiated in 1975. It was prepared in Flin Flon and forwarded to Toronto for signatures. The difficulties associated with negotiation of the first joint venture agreements were not encountered this time.

Once the initial snags in administration of the joint venture agreements with the government had been worked out, they were very similar, in terms of administration, to joint ventures with any other partner. Bill Burbidge, who was involved with paperwork such as invoice checking and progress reports, found the government considerably more flexible than it had been initially.

Line cutting began on the End claims in the fall of 1976. In January 1977, ground geophysical surveys were carried out and, by March, twenty drill targets had been defined. A limited amount of diamond drilling was completed in 1977 and more was planned for 1978.

BARRINGTON-SICKLE LAKE ACTIVITY

At the same time that geophysical surveys were being carried out on the ground staked in 1976, an HBED evaluation of data on the Barrington-Sickle Lake area was underway. Criteria for evaluation were favourable geology, and untested anomalies on 'open ground.' The data being re-

viewed had been collected previously by HBED and others in the area. Questor Surveys flew the Barrington-Sickle Lake area for the Manitoba government in October and November 1976 as phase II of the Lynn Lake survey. In early 1977, the company acquired 657 acres in two claim blocks for protective purposes, pending release of the government survey results. In March, additional ground was acquired because of rumours that Sherritt Gordon had made a find in the Counsel Lake area. The acquisition included one claim and 5,037 acres in fourteen claim blocks on known but undrilled targets. The Questor survey data was released at noon on 8 June 1977, and the exploration group (A.Olesen, T.Baumgartner, M.MacDonald, and G.Bragg) decided by 3 p.m. which ground was to be staked. By five o'clock, one claim block of high priority had been successfully staked by a crew from Flin Flon; the balance of high priority targets still available were obtained the next day. All decisions regarding the staking, except for the initial go-ahead, were made by HBED's Flin Flon personnel.

HBED experienced a drain of manpower for staking the afternoon of 8 June, as not only was the Questor survey data released, but at the same time a considerable number of dispositions were opened for staking (a relatively new practice, under Manitoba Regulation 328/74). HBED was interested in acquiring certain pieces of ground in this release, and had staking crews including recruits from the office staff stationed at Big Island Lake and in the Bear Lake area. In total, the company acquired 10,040 acres in forty-three claim blocks, known as the Jits claims, which were incorporated into the joint venture agreement signed in November 1976.

Ground geophysics on the newly-acquired ground was to commence in late 1977 or early 1978. The estimated cost of ground geophysics was \$75,000 and diamond drilling of approximately forty targets was to be about \$350,000. The expenditure on the End claims from initial work in 1976 to August 1977 amounted to \$87,000 for staking and ground geophysics.

5. International Nickel Company of Canada, Limited (Inco)

Background

Inco's history dates back to 1902, when Canadian Copper Company merged with Orford Company to form the International Nickel Company, New Jersey. In 1916, International Nickel Company of Canada, Limited was incorporated as a wholly-owned subsidiary of the New Jersey firm. Through an exchange of shares, the Canadian company became the parent corporation in 1928. In 1929, Inco acquired the assets of a well-known English producer, Mond Nickel Company.¹

Inco's exploration in Manitoba started in 1946 as a result of the discovery of the Lynn Lake copper-nickel deposits. During the next three decades, exploration led to the discovery of one of the world's most significant nickel-producing areas and the establishment of an integrated processing operation at Thompson. The company is the largest mineral producer in Manitoba and has consistently had an active exploration program in the province.

Initial exploration in Manitoba was conducted by the field exploration group, searching for new mineral deposits which had the potential to be developed economically. In more recent years, however, the focus has shifted to exploration designed to develop the full potential of the leased land already held by the company (figure 9). The Manitoba exploration by Inco is representative of the historical pattern of activity and expenditure associated with development of any major mine in the world.

Most Inco operations have been conducted in two locations: the Sudbury and the Thompson areas. The company also has major new nickel operations in Guatemala and Indonesia. Inco has been active in exploration throughout the world in order to maintain sources of supply of nickel, with programs in Africa, Australia, Brazil, Guatemala, Indonesia, Mexico, New Caledonia, New Guinea, and the United States. To reduce its reliance on nickel, Inco has begun a diversification program, beginning with the acquisition in mid-1974 of ESB Incorporated, one of the world's leading battery companies. Inco is also searching for minerals other than nickel in its diversification efforts.

1. Manitoba, *Report of the Task Force on Manitoba Minerals Policy* (Winnipeg, March 1974), pp. 63-64.

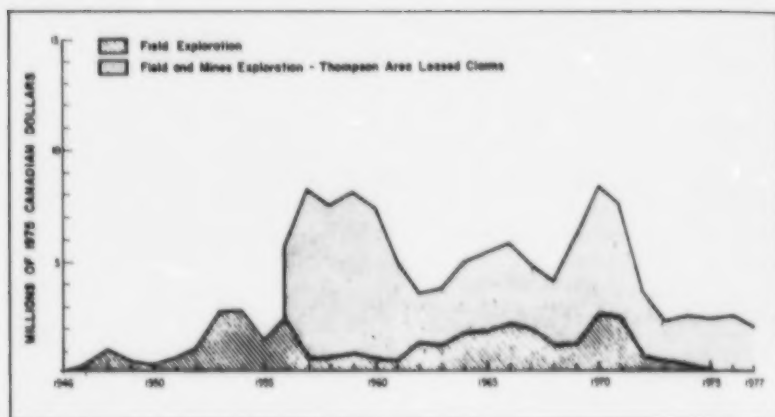


Figure 9. Inco exploration expenditures in Manitoba, 1946-77

Source: Company records.

In the initial stages of activity in Manitoba, the company was concerned primarily with searching for nickel. This strategy was followed for a number of reasons: world demand for the metal was high; it was a strategic material; new sources of supply appeared to be limited; and Inco was already the dominant producer, through its Sudbury facilities.

Interest in Manitoba was, as mentioned, stimulated by the copper-nickel discoveries at Lynn Lake in 1946. The Lynn Lake ore bodies were in gabbroic or noritic host rocks, generally similar to the Sudbury Basin, and therefore Inco was encouraged to look for similar ore bodies.

This chapter discusses the company's exploration policy and activities in Manitoba since 1946, particularly the exploration leading up to the Thompson discovery. The company's reaction to the participation provisions of Manitoba Regulation 328/74 is discussed in relation to the Phillips Lake exploration program.

Thompson Discovery

In Manitoba, work at Jack Fish Lake and at Rice Island had confirmed the favourable geological prospects noted at Lynn Lake. Other known nickel prospects at Mystery Lake, Oswagon (Roberts Estate and Central Manitoba Mines), and Island Lake (Waas Option) were acquired, explored, and found to be associated with ultrabasic host rocks. Initial work on these properties resulted in an enlarged exploration program which, in turn, resulted in discovery in the early 1950s of the Grass River-Soab Lake-Joey Lake-Moak Lake occurrences of disseminated sulphides in

ultrabasic rocks. Recognition of the Fox River intrusive complex led to exploration in this area. A large central Manitoba magnetometer air survey, and the Moak-Setting magnetometer air survey, set the stage for the search for nickel in the late 1950s in both areas (figure 10).

In 1954 an exploration shaft was sunk at Moak Lake. Exploratory drilling was conducted at two levels. Ore was found and information on geological, rock, and water conditions was obtained, but it was apparent

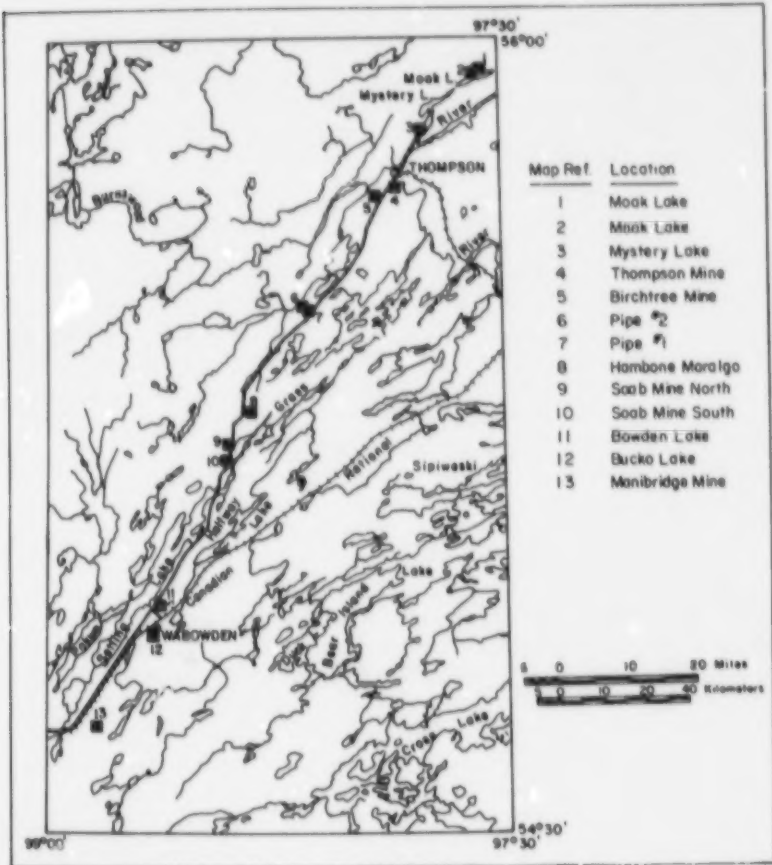


Figure 10. Mines and mining properties, Thompson-Wabowden area
 Source: Report of the Task Force on Manitoba Minerals Policy, March 1974, p. 67.

that the Moak Lake nickel deposit would not support an integrated nickel operation.

In early 1956 the Thompson deposit was discovered. After the initial drill results, activity was concentrated at the Thompson site. At a meeting in February 1956 the chairman of the company said to the directors: 'Late yesterday afternoon a telephone call came in from Manitoba to Wingate. Ralph Parker was calling, and saying: "It looks like we've hit the jackpot!"' ²

The discovery of the Thompson ore body early in 1956 eclipsed the underground exploration at the Moak deposit and provided the incentive to consolidate the scattered claim holdings in the Moak-Setting area. At Thompson, the outstanding options covering Mystery Lake Nickel Mines, the J.K. Syndicate, and other small claim holdings were exercised. Agreements signed with the Manitoba government in December 1956 covered the development of a townsite and the long-term order-in-council lease of land held by the company. Negotiations had been conducted over a period of about four months, by senior officers and legal staff of Inco and senior officials of the government of Manitoba.

The Waas option at Island Lake was exercised, and the Fox River project, about 160 miles east of Thompson, was terminated due to poor results (a more detailed study of the Fox River area in the late 1960s produced similar negative results). As a result of exploration in the Moak-Setting area, discoveries of sulphides in ultrabasic rocks were made at Pipe 1 and 2, Soab South, Nichols Lake, and a number of other localities. Underground exploration of the Pipe 2 deposit pointed up metallurgical problems associated with this type of occurrence, and other large ultrabasic bodies were given a lower priority in favour of narrow zones of higher grade mineralization such as Soab, Soab South, and Pipe 1.

By the early 1960s, most of the Moak-Setting area had been explored at least on a reconnaissance scale and the thrust of the exploration effort for nickel shifted to adjacent areas. The discovery of mineralization at Mel Lake and of the Birchtree deposit in 1962 led to further emphasis in the area surrounding the Burntwood granite where sulphide mineralization had been found. Underground development throughout the Thompson district provided the data base which indicated the Moak-Setting-Wabowden area to be the principal nickel province in Manitoba. Since the south end of this belt was held by Falconbridge, Amax, and Cominco, no room existed for exploration in that direction; that area of the leases was therefore turned over to the Manitoba Division Mines Exploration Department.

2. John F. Thomson and Norman Beasley, *For the Years to Come: A Story of International Nickel of Canada* (Toronto: Longmans, Greene and Company, 1960), p. 275.

The Lac du Bonnett region, east of Lake Winnipeg, was also explored for nickel at this time. The results were essentially negative and work ceased early in the 1960s.

Inco carried out an extensive exploration campaign, focused primarily on nickel, in central and northern Manitoba in the late 1950s and early 1960s. The results of this work were largely negative, as were those of corresponding federal and provincial geological surveys. On the basis of this evidence, it was concluded by the management of Inco's exploration department that the potential for the discovery of significant deposits of nickel in Manitoba outside of the Moak-Setting area did not warrant a continuation of intensive exploration.

Base Metals Exploration

When it was recognized that there was little scope for nickel exploration outside the Thompson district, Inco's search was broadened to look for other metals. Because of the heavy glacial cover over most parts of northern Manitoba, the airborne geophysical approach was the principal means of exploration. Air surveying of known greenstone belts was intensified, and by the late 1960s all previously unexplored or poorly explored areas aside from Lynn Lake-Flin Flon-Snow Lake had been surveyed. This base metal exploration proceeded outward from the Thompson facilities and was almost entirely aircraft supported, as the present road system was not in existence.

In the late 1960s, work again was concentrated in the Fox River area to the east of Thompson, but nothing of significance was located. Little work was carried out in the Snow Lake-Flin Flon and Lynn Lake areas because of the long standing exploration programs conducted by HBM&S and Sherritt Gordon. Some work was conducted in the Rat River area (figure 11). By 1972 all proposed air surveying had been completed, and by 1974 all high priority ground follow-up had been completed without any success in either the Churchill or Superior geological provinces. Reconnaissance work in the Seal River area was negative and specific exploration in other areas was concluded.

No exploration for uranium was attempted in Manitoba by Inco because of uncertainty about proposed federal restrictions on companies whose shares were not held entirely by citizens of Canada.

Because of the completion of all higher priority exploration, the lack of success, a diminishing supply of exploration funds, and higher geological priorities in other parts of Canada, in 1973, the director of exploration decided to terminate Manitoba exploration outside the Thompson district. The political situation in Manitoba at the time had no influence on the company's decision.

Following the 1969 announcement of the discovery of the Ruttan Lake copper-zinc deposit by Sherritt Gordon Mines, Inco exploration for base metals was increased in the immediate area. The following work was decided upon and completed by the company during the period 1969-1972:

Airborne surveys	4,149 line miles
Claims staked	887 (partly as claim blocks)
Anomalies investigated	110
Detailed geophysics	23 claim blocks
Holes drilled	168 (average depth of 195 feet)
Footage drilled	32,745

The cost of this work in actual dollars spent during the four years was:

Airborne surveys	\$ 25,480
Staking, geophysical and geological surveys	150,263
Drilling	214,815
Transportation	<u>218,974</u>
Total	\$609,532

In terms of equivalent 1975 dollars, this amounted to \$863,889.

The results of this work were negative, with the exception of an intersection of 1.45 percent copper over 0.3 feet.

Figure 11. Case history: Rat River area, Manitoba

Source: Inco company records.

Phillips Lake Exploration

Airborne magnetic and electromagnetic surveys, geological mapping, and staking had been carried out in the Phillips Lake area between 1952 and 1956. By 1965, ground geophysics, additional geological evaluation, and a fairly intensive diamond drilling program were completed. As a result, two large and several smaller potentially promising formations were located. The two larger ones were drilled at 800-foot intervals, because several narrow stringers of massive sulphide had been encountered in the early drilling, but the stringers were found to be too narrow, too widely scattered, and lacking continuity.

Because of higher priorities elsewhere in the Moak-Setting area, little work was done on the Phillips Lake claims between 1966 and 1973. In 1974, a four-week mapping program was completed, and a decision was

made by the Mines Exploration Branch of Inco's Manitoba division to carry out an additional program in 1975 for the following reasons:

- i a large fold structure remained to be tested by drilling;
- ii a few geophysical anomalies had been unexplained by previous work;
- iii there was some hope for a concentration of sulphides off the ends of the ultramafic bodies;
- iv the original Phillips Lake leases, which were not order-in-council leases, appeared to be threatened by government regulations which were then in the draft stage. It appeared that more work would be required to maintain this ground.

Since the requisite \$500,000 had not been spent in any single 1,940 acre block of land, it would not be possible to obtain an 'explored area' lease under the proposed regulation.

The alternatives were either to drop the ground, or to do more work as a final check. The work undertaken in the early winter of 1975 was therefore a continuation of a program that had been initiated in 1974, and was already in progress when the new mining regulation came into effect on 11 January 1975. Copies of the regulation were received in Thompson and Toronto by about mid-January. Although draft versions had been circulated in 1974, company representatives had not anticipated that the measures adopted would be as drastic as actually transpired.

It was not until the end of January or early February that most of the implications of Regulation 328/74 were finally realized by members of the Inco Exploration Department, including exploration staff in Manitoba. The only choices available were to abandon the work, or to invite government participation. The latter course was selected, even though 'Appendix C, Form of Agreement' had not yet been circulated. Company managers did not know, until a copy was mailed to them on 14 March 1975, that the terms of this agreement would be unsatisfactory.

Company representatives were dissatisfied with several aspects of the agreement. First, the minister, in effect, wore two hats: he both administered the regulations and participated in the exploration and eventual development. Second, the agreement indicated that the government was not willing to negotiate any of the terms. The Inco position was that each agreement should be tailored to accommodate the objectives of both parties. Finally, although the government offered to contribute to the cost of exploration in direct proportion to its participating interest, it was not prepared to recognize any specific expertise that the private exploration group could contribute, or to make allowance for earlier work and expenditures incurred by the nongovernment participant. Inco had no desire to enter into such an agreement. Furthermore, by March the program was nearly completed.

The work in 1975 included a program of ten diamond drill holes which tested geophysical targets in the most favourable geological areas. The results were negative: the best intersection graded 0.7 percent nickel over 4.7 feet. It was decided that there was little or no potential for an economic deposit at Phillips Lake, that additional work was not warranted, and that all the claims should be abandoned. The whole 25,685 acres was dropped. With the benefit of hindsight, it was felt by company exploration personnel that the area had been over-drilled. Sixty-eight holes had been drilled over a span of some twenty years. The magnitude of the total effort can be explained by the fact that from time to time over this period there appeared to be some encouragement, and management simply did not want to give up too soon. The Phillips Lake exploration was one of the last projects outside the order-in-council lease areas. When it was completed, all field exploration personnel were transferred elsewhere and no Inco exploration has taken place outside the Thompson area leases since that time.

Background

Noranda is a diversified worldwide company, with Canadian operating interests in mining, smelting and refining, fertilizer plants, forest products, and manufacturing. It also has international interests in the USA, the Dominican Republic, Iran, Mexico, Columbia, Spain, Venezuela, Nigeria, Brazil, New Zealand, South Africa, Australia, Chile, Nicaragua, Ireland, and the Philippines.

Noranda had been active in exploration in Manitoba since the 1930s, starting with seasonal prospecting parties in the areas around Lynn Lake and Flin Flon. In the mid-1940s the company established a permanent staff in Flin Flon.

The 1976 annual report indicated an active exploration program throughout the world, with a budget for mineral exploration and development of \$21.6 million. Of this amount, 47 percent was spent in Canada, 34 percent in the USA, 3 percent for ocean mining, and 16 percent in other countries. Exploration interests in Canada in 1976 were in copper-zinc deposits in British Columbia and Quebec, and in uranium in British Columbia and Saskatchewan. Noranda was also involved in exploration or preliminary negotiations in Chile, Saudi Arabia, Australia, Zambia, Korea, Cyprus, Ireland, Peru, and Brazil.

In 1975, Noranda decided to cease exploration in Manitoba, as a result of changes in government mineral policies. The Noranda cases illustrate the company's efforts to negotiate exploration agreements with the government prior to this decision. The Morton Lake project also provides a description of a ground follow-up decision process.

Morton Lake Project

Although air surveys of the Morton Lake area of Manitoba had been conducted by Hudson Bay Exploration and Development in 1958, it was not until 1970 that the geology of the area attracted the active attention of Noranda Exploration (Norex). The combination of a proposal by the

central division exploration group and an interest in the area on the part of the Toronto head office exploration group provided the initial impetus.

In 1971, Norex had Questor conduct a survey of the Morton Lake area, which was generally covered by heavy overburden. The results indicated a string of anomalies, but ground follow-up carried out during 1972 and 1973 did not reveal any economically feasible mineralization.

During 1974, however, the Manitoba government released new geological maps which included coverage of the Morton Lake area. With this new information, Norex central division staff was able to re-evaluate the results of the 1971 Questor survey. At this point, some anomalies that had not been examined previously assumed new interest. At the same time, potentially favourable ground previously held by other companies became available.

In January 1975, Norex staked a total of fifty-six claims in the Morton Lake area. The claims covered the southern extension of a long conductive anomaly which had been outlined in the 1971 survey. The decision to stake the ground was made by the Winnipeg staff of the central division of Norex. The northern end of the conductive zone was held by HBED.

Between 1970 and January 1975, Noranda Exploration had spent approximately \$130,000 in the general Morton Lake area. The newly acquired ground at Morton Lake represented a continuation of the program which had begun in 1970.

NEGOTIATIONS

On 29 January 1975, Norex filed a program of exploration at Morton Lake with the Manitoba government, with an estimated cost of \$46,710. Work began on the project prior to official acceptance by the government, for two reasons. First, there was nothing in the new regulations which prevented a company from proceeding prior to government acceptance. Second, the logistics of ground follow-up work during the winter season required an immediate start. During January, twenty miles of line cutting were completed and most of the ground geophysical work was done. In a letter dated 17 February, 1975, from the minister of Mines, Resources and Environmental Management to the exploration manager for the central region, the government accepted the program as proposed, and outlined the procedures to be followed:

In order to expedite matters, it is suggested that you enter appropriate data pertaining to the above program in Schedules A, B, and C of Appendix C and forward this information to Dr. Haugh. When completing Schedule B, it would be helpful if you would include an outline of the program budget, broken down according to operating and capital expenditures. An approximate cash flow projection by month would also be of assistance to us.

In filing future programs under Section 3 of Manitoba Regulation 328/74, you may wish to follow the above procedure and enter program data directly in Schedules A, B, and C of Appendix C. A map showing the location of the mineral disposition(s) on which the program is to be carried out, together with any other information relative to the program, e.g., option agreements and an outline of previous exploration, should also accompany the program. Additional copies of Appendix C are enclosed for your further use.

The proposal (Appendix C of the Manitoba Regulation 328/74) was forwarded to the secretary and legal counsel of Noranda Exploration in Toronto. This practice was normal for Norex in all legal matters. However, in previous joint ventures, Norex had been able to negotiate the terms with the other partner(s), while in this case a standard agreement had been developed by the government for use in all joint ventures. Norex felt it was prudent to conduct clause-by-clause analysis of the government's standard agreement form. On 17 March, the secretary of Norex communicated his comments to the Norex Winnipeg office concerning the proposed form of the agreement:

I have reviewed the proposed form of agreement sent to you by Mr. Green on February 17, 1975.

Since this will be our first agreement with the government, I suggest that we go through it carefully as it will serve probably as the basis for all future agreements.

EXPLORATION

In January and February 1975, at the time Norex was conducting geophysical surveys on claims in the Morton Lake area, HBED was completing four drill holes on the northern extension of the same conductive trend. HBED allowed Norex to log the core from these holes, one of which was 800 feet north of one of the claim blocks held by Norex. A total of 2300 feet of core was logged by a Norex field geologist who reported:

HBED drilled 4 holes immediately north of the Noranda property as outlined on the included map. The writer logged all 4 holes totalling 2,300 feet. No economic metals were seen in any of the core! Hole #275 immediately north of our property encountered graphite and pyrrhotitic and pyritic conductors within argillitic host rocks. The last hole, #227 was collared in argillites, (from 0-10 feet and rhyolite breccia from 10-550 feet. Only disseminated pyrite and odd streaks of sulphides were seen in the core. It appears that a conductor was not intersected.

Because HBED had drilled a hole so close to the north end of the Norex property, Norex central division staff decided to test the conductor much farther to the south. A drill hole was started in May at a point where overburden was estimated to be 100 to 125 feet thick, and when sand and boulders were encountered to a depth of 207 feet the hole was abandoned.

A Norex geologist decided to abandon the project for 1975 because of spring breakup. Further drilling would have required the use of a larger drill.

CONTINUING NEGOTIATIONS

During April and May of 1975, the *ad hoc* Exploration Committee of the Mining Association of Manitoba was meeting with various representatives of the Manitoba government to discuss the joint venture agreement. Consequently, Norex did not forward to the government the letter of 17 March, in which the company's views on the agreement were outlined, until early in June. The manager of the central division for Norex then had three or four meetings with representatives of the Department of MREM, which included the minister and deputy minister. The response of the government representatives was, briefly, that they were not in a position to negotiate an agreement. The central division manager forwarded the government's response to the Norex legal counsel on 18 June. In his accompanying letter, he stated:

We have completed our ground follow-up on this \$Morton Lake property with negative results. I shall bill the government for their portion of the expenses as soon as the agreement has been executed.

The Norex central division manager was notified by the deputy minister of MREM on 15 August 1975 that the government was considering some revisions to Appendix C of the Manitoba Regulation 328/74, as a result of the discussions between the Mining Association of Manitoba and the government representatives.

Following a government request for a signed agreement, the legal counsel for Norex forwarded copies of an agreement executed by the company to the central division manager on 30 September, with a request for a proper execution by the government. At this point Norex felt there was no way that any changes could be negotiated with the government in the standard form of agreement, and was therefore attempting to conclude an agreement with the government so as they could 'get their money and get out' of exploration in Manitoba.

The central division manager received notice from the minister of MREM of a meeting on 25 November, when amendments to Appendix C would be discussed.

In a letter dated 14 November 1975, the assistant deputy minister for the Mineral Resources Division of the Department of MREM informed the Norex central division manager that the draft agreement forwarded to him for the Morton Lake project on 30 September was not acceptable, pending completion of the review of Appendix C. On December 19, the

assistant deputy minister forwarded to the manager of the central division copies of revised Appendix C stating:

Further to my letter of November 14, 1975, I now enclose two copies of revised Appendix C, the Form of Agreement under Manitoba Regulation 328/74.

Please complete Schedules 'A', 'B', and 'C' for the Morton Lake exploration program and have both copies signed on behalf of your company and return to me for execution by the Minister.

Copies of the revised agreement form were forwarded to the Norex Toronto office; the secretary of Norex suggested further changes for consideration by the government. At this juncture, the central division staff became inactive, and discussion concerning revisions to the Morton Lake joint venture agreement was carried on between Norex Toronto and the assistant deputy minister. However, since no significant changes in substance had been made by the government, and further negotiations were unlikely, Norex proceeded to execute an agreement covering the Morton Lake project.

On 16 February 1976, Norex legal counsel forwarded to the assistant deputy minister an initialed copy of the agreement. The government completed execution of the agreement and returned a copy to Norex in Toronto on 1 March 1976. On 22 June 1976, the Norex central division manager informed the government that Norex was unable to recommend further work on the Morton Lake project and that official notice of termination would be forthcoming. In a report accompanying the letter the reasons for the Norex decision were outlined:

The geophysical surveys outlined a continuously conductive trend with a magnetic association. Although an attempted drill hole on line 96S did not penetrate bedrock, the diamond drilling done by Hudson Bay by the northern extension of the trend did intersect the cause of conductivity. The conductor was due to graphite and iron sulphides.

The total expenditures for the project up to 31 December 1975 were \$28,956. Norex requested reimbursement of \$14,478 from the government.

In a letter dated 23 August, Norex was notified that reimbursement of \$13,727 for work at Morton Lake had been made. The amount of \$1,364 had been disallowed on Norex's claim because it was said that these expenses did not pertain to the agreement.

Seal River Project

In early 1972, Noranda Exploration initiated a 'grassroots' program in the Seal River greenstone belt of Manitoba. This program consisted essentially of reviewing the assessment files for previous work and checking

geological parameters. Although very little exploration had been carried out in the area prior to 1972, company managers felt that the geological environment at Seal River was favourable for massive sulphide deposits. At this time Norex began implementing a new approach to exploration work, concentrating on more effective use of geological parameters to 'nail down' the specifics of an area to be explored, and requiring small-scale airborne surveys. The survey of the Seal River area was the only one flown in a new area by the company in 1972; other airborne reconnaissance involved re-flying of areas which had been surveyed with earlier techniques.

1972 AND 1973

On 30 June 1972, a report prepared by a company research geologist was presented to Norex management in Toronto, concerning the method for inspecting the Seal River volcanic belts and ultramafic intrusions. The report provided information about methods for conducting the prospecting and geophysical survey work in the area, based on an evaluation of outcroppings and geological structures in the area. As a result, the company decided to progress with work in the Seal River area.

Norex obtained permits to conduct airborne geophysical surveys in the Seal River area, and also received an exploration reservation covering some 197,000 acres. Both applications were submitted to the Department of Mines, Resources and Environmental Management on 18 October 1972. On 13 December 1972, Questor Surveys was authorized to proceed with an INPUT survey of the Seal River area. The survey was flown in March 1973, over a total of 1,221 line miles, and outlined thirty-one conductive zones.

The central region exploration staff, including the field geologist and geophysicist, decided to carry out geological reconnaissance in the summer of 1973 on the conductive zones identified in the Questor survey.

1974

In March and April 1974, grids were cut over several of the anomalies, and electromagnetic and magnetic surveys were conducted. The original eighteen-month period of the exploration reservation terminated on 30 May 1974, and, in compliance with regulations, a summary of work was submitted to the chief mining recorder on 7 May. As of 30 May, the original reservation held by Norex was reduced to two areas: parcel 1 containing 21,120 acres, and parcel 2 containing 67,200 acres.

A diamond drilling program proposal, including cost estimates, was completed by the project geologist in March 1974. At the end of May, Norex submitted an assessment report on geophysical data from the Seal River reservation to the chief mining recorder. The report also contained

recommendations outlining further work to be completed on a number of anomalies. Total expenditures on the Seal River reservation to July 31 1974 were \$119,214.

The central division manager proposed a joint venture project to the vice-president and chief geologist for Manitoba Minerals Resources Limited (MMR) in a letter dated 7 October 1974 which outlined the work completed and the results to that point. The project was to cover the drilling phase of the Seal River program. The proposal was made by Norex in anticipation of changes in mining legislation based on the government white paper. Norex had been involved in previous joint venture arrangements with MMR and felt that, if it were necessary to participate with the government in exploration, they preferred to deal with MMR. MMR replied on 30 October 1974, stating that the project was attractive but that, due to budgetary limitations, it was unable to enter into a joint venture arrangement. Norex did not attempt to find another joint venture partner.

1975

In May 1975, prior to expiry of the reservation, Norex staked ten separate claim blocks in the Seal River area.

In January 1975, the new mineral regulations had become effective. As the Norex representative, the central division manager became active in the Mining Association of Manitoba in order to deal with the new role of government. In June 1975, Norex took the basic approach, in dealing with the government, that:

- i the company offered expertise in exploration and had an ongoing exploration program in Manitoba;
- ii Norex's position differed from that of other major companies exploring in the province. Unlike firms with producing mines and associated processing facilities in Manitoba, Norex could be very flexible (e.g. move its exploration operations elsewhere);
- iii the government should earn an equity position in a property by becoming involved in joint funding of 'grass roots' exploration.

The Norex central division manager attended several meetings with senior officials of the Department of MREM. The manager concluded from these meetings that the government was very inflexible on the new regulations and, in particular, on joint venture arrangements.

In June 1975, the central division manager contacted the deputy minister to outline several key issues which would affect the future exploration policy of Norex in Manitoba. Two major topics were presented by Norex in a letter dated 18 June 1975:

- i Norex proposed that, in future, all its exploration programs, regardless of nature, be presented to the government for consideration and participation. The presentation of such a program or programs, together with budget estimates, would be submitted during the late fall prior to the beginning of the next exploration year. After review of proposed programs and budgets (it was suggested), a single joint venture agreement should be entered into, covering the entire budget for that year. Should the government decide not to enter certain projects, these would be deleted from the agreement and the company would be free to proceed on its own. In general, there would then be one agreement covering specific programs and budgets for the next budget year.
- ii Norex, like most exploration companies, had found that it was advantageous and very necessary to maintain a good relationship with prospectors and small exploration companies operating in any given area. Very often these individuals are responsible for making new mineral discoveries. Therefore, option arrangements negotiated with prospectors and small companies, to acquire potential mineral deposits, should be recognized by the government as an exploration cost under the terms of the joint venture agreement.

The deputy minister replied in a letter dated 22 July to the Norex central division manager:

This will confirm that the Department will consider entering into a single agreement under Manitoba Regulation 328/74 to cover the entire or a major portion of the exploration program of Noranda Exploration Company Limited in a specific year.

The second point raised in your letter was discussed at length in our meeting of June 5th, 1975. At that time it was 'arm's length' basis to prospectors provided that such costs are equated to work done, or caused to have been done, by the prospector on the property. Where the prospector retains a carried interest in the property, this interest would be borne by both the Department and the company, in proportion to their respective interests in the property.

Following this letter from the deputy minister, Norex management was further convinced of the government's inflexibility regarding the new mining legislation. In September 1975, the president of Noranda attended a conference in Saskatoon which was addressed by the minister of MREIM for Manitoba. From a reply made by the minister to a question put by the president of Noranda, company representatives concluded that the Manitoba government did not value Noranda's presence in the province.

In January 1976, the Norex central division manager met with representatives of the Department of MREIM to propose a work program on the Seal River property. A letter and a report, with accompanying maps, were sent to the Mineral Evaluation Branch on 20 January 1976. The program

included ground geophysics, geology, diamond drilling, and trenching at an estimated cost of \$160,627. The Norex proposal was as follows:

In presenting the program, we are inviting the government to finance the 1976 program and subsequent programs until such time as they have earned a 60 percent interest and the company has been reduced to a 40 percent interest. At this point, the company requests the option to participate in future programs and thus maintain a 40 percent equity. Should the company elect not to participate, it would then be further reduced to a 20 percent equity position.

The above forms the general terms of the proposed agreement being contemplated at this time.

This proposal was initiated by the central division manager for a number of reasons, including the following:

- i the Seal River program was not completed;
- ii the funds for investment in exploration in Manitoba were restricted;
- iii Norex was not prepared to lose its equity position in the property.

However, the company felt that the government should finance the next phase of exploration to the extent of the amount already invested by Norex. In this way the government would earn an equity in the property. Upon completion of this additional work, Norex would have the option to participate as a major partner in the program or dilute its interest in the property.

In a letter dated 5 February 1976, the deputy minister informed Norex through the central division manager that:

The Department will enter into an agreement for a participating interest in this program, as provided in subsection 5(1) of Manitoba Regulation 328/74, whereby 50 percent of approved expenditures will be honored for payment in accordance with the Regulation and an appropriate agreement thereunder.

The Department is not prepared to finance this program such that it would earn an interest greater than 50 percent as outlined in your letter.

The central division manager wrote to the deputy minister on 17 February, informing him that, as a result of the government reply, Norex had decided not to proceed with exploration on the Seal River project.

On 8 March 1976, the deputy minister asked for further explanation of this decision, and enquired whether the program would be submitted again in the future. In a letter dated 18 March, the Norex central division manager outlined the reasoning behind the decision.

Under the circumstances, [this government would only honor, for payment, 50 percent of approved expenditures] does not provide sufficient incentive for the company to proceed with the proposed program. As you realize, this will put our claim groups in jeopardy because we will not have sufficient work completed to meet our assessment requirements next year.

Subsequent to our involvement in the Seal River area, it is interesting to note that Manitoba Minerals have entered into three separate joint ventures in adjoining areas. It is my conclusion that the government too recognizes the Seal River area as having considerable economic potential and must consider it as an active exploration area. We, therefore, feel that because we will be unable to retain our claim groups beyond next year, we will lose our investment in the mineral dispositions that we now hold.

To answer your question as to whether it is the company's intention to resubmit the program at a later date, I would like to suggest to you that we would be available to discuss the proposed program at any time.

7. Rock Ore Exploration and Development Limited

Background

'Rock Ore is a junior mining company, engaged principally in exploration for minerals and preliminary mining development. Its objective is to acquire mining properties and develop them to the state which makes them attractive for full development by Rock Ore alone or under joint venture agreements with others. Rock Ore follows an active policy of exploring, staking, drilling and developing new areas, including geological and geophysical work in areas of significant interest.'

The Company has been in a high risk business since its inception in 1971. Its economic success has depended upon its ability to find and realize revenue from mineral deposits. The disappointments inherent in exploration were illustrated in an incident observed by one of the researchers in his first visit to the office of Leif Mamen, the company's president. Mr. Mamen, over seventy-five years old and a veteran of the exploration business, received a telephone call concerning drill core assay results. The person calling apparently read a list of results; Mr. Mamen commented as the caller went down his list, his tone going from optimism to resignation, 'nothing . . . nothing . . . nothing . . . nothing in any of them, eh?'

Rock Ore has engaged in exploration and development principally in Manitoba. However, according to Leif Mamen, mineral policies and legislation made it impossible to underwrite a share issue for mineral exploration in the province. In 1976, therefore, the company moved actively into oil and natural gas exploration, largely because of the need to obtain share underwriting. The area to be explored for oil and natural gas covered over 11,000 acres in the Harman North Prospect of Alberta.

The primary objective of the company, however, has been to acquire mining properties and develop them to a state which makes them attractive for full development, by other companies, by Rock Ore alone, or under joint venture agreements.

The company was organized as a mining syndicate in October 1970, to pursue Mamen's plan to develop a prospector training program for

1. Rock Ore Exploration and Development Limited, *Prospectus*, December 1976.

Indian and Métis people in northern Manitoba. The hope was thus to mobilize a large number of prospectors who would have a loyalty to Rock Ore.

Rock Ore was incorporated as a company in April 1971, because of a need to raise capital for continued activity. Specifically, the company's intention was to use the capital to purchase its initial royalty interest and a right to a participating interest in the Harman North Prospect. There was no need for additional capital to finance mineral exploration at that time.

Since before its incorporation, the company has followed a policy of exploring, staking, drilling, and developing, including geophysical and geological work. Properties held by Rock Ore in Manitoba (figure 12) as of mid-1977 included Arbour Lake, Diana, Begg Lake, and Wither Lake, a uranium prospect in the Seal River area of northern Manitoba. Most of the exploration work carried out in recent years has been on the Arbour Lake and Diana properties.

Arbour Lake Property

1970-1974

The Arbour Lake property consisted of ten claim blocks and one single claim lying approximately eleven miles northeast of Lynn Lake. Some of this area had been looked at prior to 1970. In April 1970, claim block no. 2899 was staked by Leif Mamen. Following the formation of Rock Ore Mining Syndicate in October 1970, this claim block was purchased by the syndicate. A work program, consisting of prospecting, blasting, trenching, 229 feet of drilling, and an electromagnetic survey, was undertaken on the property during the period October 1970 to May 1971. Additional claims were also staked. Total expenditures by Rock Ore Syndicate on five claim blocks to May 1971 were \$23,765.

In 1972, following the incorporation of Rock Ore Exploration and Development Limited and the subsequent purchase of the Arbour Lake claims from the syndicate by the newly formed company, four additional claims (CB 4199) were staked. At this time Rock Ore entered into a joint venture agreement with Gigantes Exploration Company, a subsidiary of Cyprus Mines Corporation of Los Angeles.

The agreement with Gigantes was a result of the friendship of Paul Sawyer, a mining engineer with Cyprus, and Leif Mamen. Mr. Mamen approached Mr. Sawyer with assay results from the Arbour Lake property, and an agreement was subsequently signed which provided financing for exploration on the property. Gigantes managed the program, which was to provide complete coverage of six claim blocks then held by Rock Ore, in order to define additional targets and investigate more fully

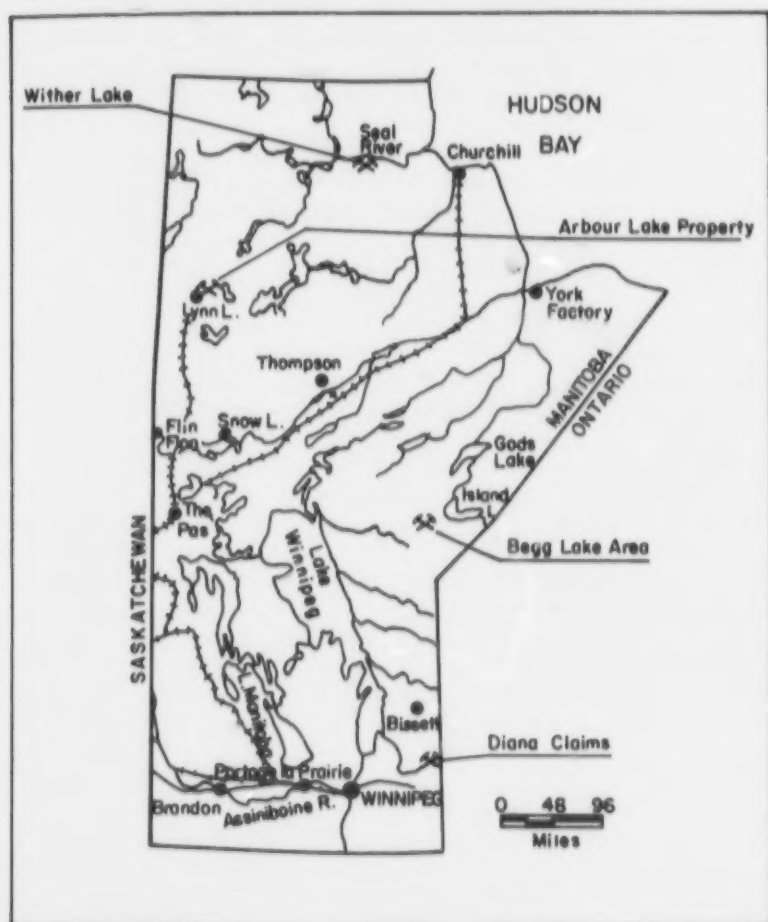


Figure 12. Property location map, Rock Ore Exploration and Development
 Source: Rock Ore Exploration and Development Limited, *Prospectus*, December 1976, p. 24.

the mineralization encountered earlier. Expenditures on the Arbour Lake property in 1972 totalled \$46,054.

Two additional claim blocks were staked by Stan McLeod on behalf of Gigantes and Rock Ore in 1973, and subsequently a work program totalling \$67,635 was completed. In July 1974, Gigantes terminated the joint venture after reorganization of the Cyprus Mines group of Canada. Mr. Mamem speculated that the Gigantes decision may also have been

influenced by proposed changes in the mining legislation. Prior to termination of the agreement, Gigantes spent \$46,423 on a limited program in 1974, bringing the total amount spent by Gigantes on the Arbour Lake property to \$160,122.

1975-77

After the new mining regulations were made public in January 1975, Rock Ore had no success in its attempts to develop a joint venture arrangement with any private sector exploration company. Mr. Mamen again speculated that the difficulties encountered in attracting a joint venture partner were the result of the mining legislation in Manitoba. In the face of inability to locate a partner, the stipulations of the new mining regulation, and the need for capital to finance exploration, Rock Ore entered into an agreement with the Manitoba government in October 1975.

Mr. Mamen stated that the company had not consulted legal counsel at the time or attempted to negotiate an agreement with the government, and that he had dealt, without incident or conflict, with Dr. Haugh and Mr. Frohlinger of the Department of MREM. The agreement allowed Rock Ore to be reimbursed up to the amount of \$168,000. The government was to contribute 100 percent of the funds. Exploration began immediately, and by March 1976, \$160,000 had been spent on geophysical and diamond drilling; the balance was used for a more detailed electromagnetic survey. In addition, Rock Ore was entitled to a 10 percent management fee based on the amount of reimbursed expenditures. As of 30 November 1976, the estimated interest of the province in the Arbour Lake properties was 45.4 percent.

According to the 30 March 1977 progress report, no further work was planned on the Arbour Lake property in the immediate future. This decision was made by the board of directors of Rock Ore, on the recommendation of Paul Sawyer. Total expenditures on the Arbour Lake property during the period 1970 to 1976 had been \$344,000.

Diana Property

1973-1974

The Diana gold mine and adjoining property had been staked as early as 1928. Mr. Mamen first staked and recorded claims on Rock Ore's behalf in this area in 1973. Their Diana mine property consisted of two claim blocks totalling 735 acres and an additional fourteen mineral claims in the Rice Lake area of southeastern Manitoba.

The Rock Ore claims were the subject of a joint venture agreement, effective 15 May 1973, between Rock Ore, Gigantes Exploration, and

Selco Mines. The agreement with Gigantes Exploration and Selco was again the result of a proposal by Leif Mamen to Paul Sawyer. The agreement between the two companies called for \$500,000 to be spent over three years. Selco was to manage the project and Rock Ore was to end up with a 20 percent interest in the property. During the period from May 1973 to July 1974, work consisted of ground geophysical follow-up of an earlier Questor INPUT electromagnetic survey, followed by diamond drilling to test various conductors. The program was oriented toward base metals. The joint venture was terminated in July 1974 because of negative results, and the claims reverted wholly to Rock Ore Limited. The expenditure to that date on the joint venture totalled approximately \$65,800.

1975-77

In October 1975, the Diana claims became the subject of a joint venture agreement between Rock Ore and the province of Manitoba. The agreement, formulated on behalf of Rock Ore by Leif Mamen in consultation with Paul Sawyer, provided for a work program in 1976 with a maximum expenditure of \$60,000. The program included line cutting and magnetometer and electromagnetic surveys, over a closely spaced grid covering the immediate mine area. The expenditure on the property in 1976 was only \$11,485, as a result of a company decision to postpone the drilling phase because of failure to locate suitable drill targets. The interest of the province in the Diana properties as of September 1976 was 13.9 percent.

A subsequent re-evaluation of the electromagnetic data by Paul Sawyer and Ross Kidd, consulting geologist, added new information and gave more significance to two conductors originally thought to be unimportant. Rock Ore completed a program which included geophysical field work, followed by diamond drilling of the conductive zones, but the drill results were negative. The work was an extension of the original Diana agreement with the province.

The company staked claim blocks adjacent to the Diana property in the Slate Lake-Lily Lake area of Manitoba. Exploration during the summer of 1976 included line cutting, a limited amount of geophysical surveying, and some prospecting. In October 1976, Rock Ore entered into a joint venture agreement with the province of Manitoba to conduct an exploration program on the property. The estimated total cost of the program was \$18,590, with work to be completed by February 1977. Following some interesting results, Rock Ore planned a diamond drilling program to test certain conductors.

In a progress report issued by Leif Mamen on 15 April 1977, the company reported an agreement with the province which amalgamated the Diana mine and adjoining Slate Lake-Lily Lake programs into a single agreement. As a result, Rock Ore was able to preserve a larger final

interest in the Diana mine property than under the previous agreement, which had called for 100 percent of the money to be provided by government. In effect, this was the first effort made by Rock Ore to 'negotiate' an agreement with the government. Previously, the company had simply signed the standard agreement.

The estimated cost of the new program was \$132,867 for 1977. The work under the new agreement, which began 10 May 1977, included magnetometer and electromagnetic surveys, and over 5,000 feet of diamond drilling.

Begg Lake Property

The Begg Lake property consisted of eighteen claims in the Oxford Lake area of the Winnipeg mining district. Following staking of the ground in June 1973, Rock Ore carried out exploration, including line cutting, soil sampling, rock drilling, and blasting. Rock Ore held a 90 percent interest in this property, and the original prospector, Jack Lawson, had a 10 percent interest. The property was of interest to the company because of preliminary copper, gold, and silver showings. As of mid-1977, no economically feasible mineralization had been encountered.

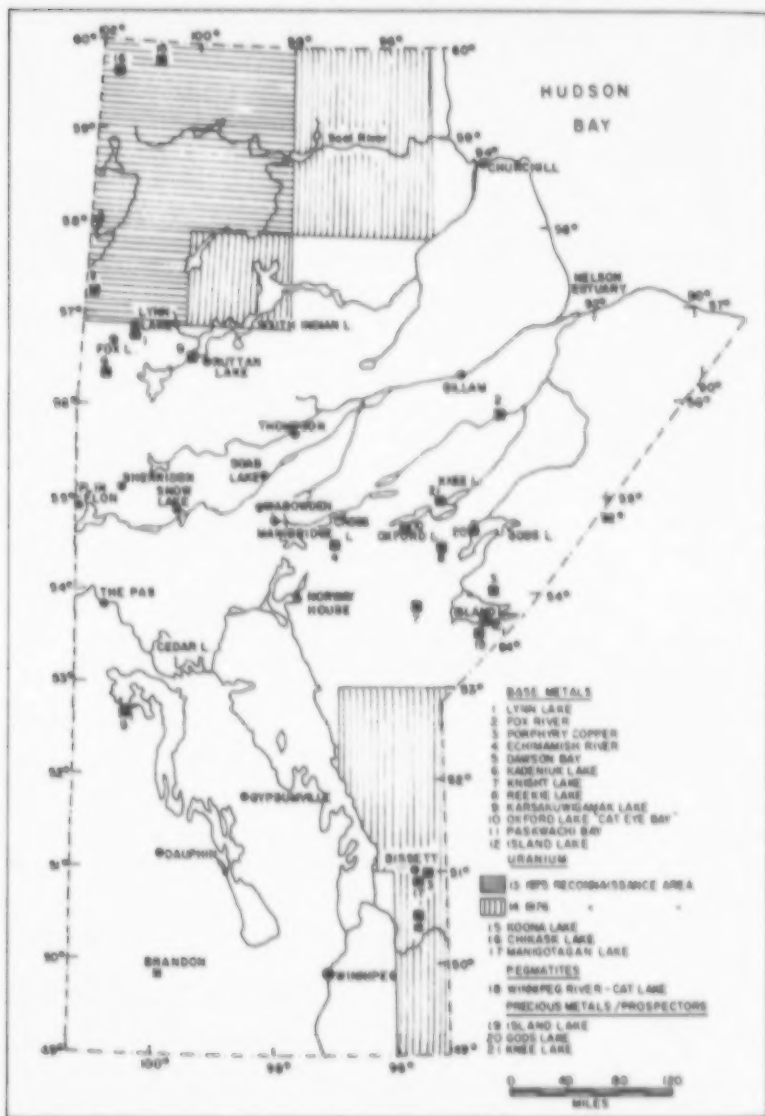
8. Exploration Operations Branch of the Government of Manitoba

Background

The Exploration Operations Branch (EOB) of Manitoba's Department of Mines, Resources and Environmental Management was established as part of the Mineral Resources Division (see figure 6) in August 1974. The branch was created to pursue the government's policy of seeking a greater share in the returns from natural resources through the development of departmental capability in the planning, coordination, and implementation of mineral exploration. Its activities were designed to take up any 'exploration slack' resulting from a decrease in private sector activities, as well as to encourage further private sector exploration and development. A major portion of its funds were provided under the federal/provincial subsidiary agreement for mineral exploration.

In order to perform its exploration function, the EOB had to develop a team of qualified personnel. The branch also maintained close liaison with the Geological Services and Mineral Evaluation and Administration branches, which assisted in selection of potential exploration areas and evaluation of findings. Projects could be initiated with the branch, or on the recommendation of the Mineral Evaluation Section. Potential projects were examined thoroughly, through consultation at branch and divisional levels, as well as with the assistant deputy minister responsible for the EOB. Approval of the Management Committee of Cabinet was required for items exceeding \$25,000. EOB activities included:

- i selection of areas with economic mineral potential for new and follow-up departmental exploration ventures;
- ii execution of geological, geophysical, and geochemical surveys for location and evaluation of mineral deposits;
- iii implementation of diamond drilling programs to test such deposits;
- iv negotiation of agreements and contracts (but not joint venture agreements) with outside agencies and industries for specialized or large-scale exploration operations;
- v administration of the DREE subsidiary agreement with respect to mineral exploration, particularly for uranium and for base metals.



Uranium Exploration

Under the Uranium Reconnaissance portion of the subsidiary agreement, major reconnaissance surveys were conducted in 1975 and 1976 (see figure 13). The first survey, actually conducted by the Geological Survey of Canada, covered an area of 25,000 square miles in northwestern Manitoba. Detailed follow-up surveys of the anomalies identified were conducted in 1976, and included airborne and ground scintillometer surveys, boulder and lake sediment sampling, and diamond drilling. Major reconnaissance surveys were also conducted in 1976, over a 20,000-square-mile area west of Churchill, and a 17,000-square-mile area east of Lake Winnipeg. These reconnaissance and ground follow-up activities stimulated considerable private sector uranium exploration in the province.

Base Metal Exploration

LYNN LAKE

The Exploration Operations Branch was interested in exploring for base metals in the Lynn Lake area for a variety of reasons, including:

- i Sherritt Gordon's Farley mine at Lynn Lake appeared close to depletion;
- ii Sherritt Gordon's Fox Lake mine was estimated to have only eight years of ore reserves;
- iii the community of Lynn Lake relied almost entirely on ore production from these two mines for its employment, economic survival, and tax base;
- iv geological formations in the area were favourable for copper and zinc;
- v no systematic and sizable exploration program was being undertaken in the area.

As background, two studies were undertaken by the Mineral Evaluation and Administration Branch in 1975. The first investigated previously-identified copper-zinc sulphide deposits, and concluded that there were more than forty massive deposits in the region in addition to the one at the Fox mine. The second study analyzed previous geophysical work, and concluded that there was a need for a new airborne geophysical survey of the area. Consequently, EOB decided to initiate phase I of the Lynn Lake air survey.

An agreement was signed with Questor Surveys Limited on 31 March 1976, and Questor's INPUT system survey of 1,200 square kilometers (phase I) in the Lynn Lake area was flown between 16 and 21 March 1976. Since the budgeted amount for the survey was \$97,500, Management Committee approval was required.

From late 1975 until completion of the Lynn Lake area reconnaissance survey, senior government officials were considering alternatives for ground follow-up exploration. The three options under consideration were: to keep the results of the survey confidential, and do follow-up work 'in house'; to investigate the possibility of working jointly with a private company; or, to release the information to all interested parties on open file. In March 1976, the government decided to release the survey data to the public.

The 3 June 1976 edition of the *Northern Miner* reported:

The results of an airborne electromagnetic and magnetometer survey, covering 3,900 line miles over an area of 13 miles radius of Lynn Lake, Manitoba, will be released to the public by Mineral Resources Division, Manitoba Department of MREIM at 12 noon, June 22.

Prior to the release of survey results, approximately one third of the area covered by the survey had been staked; following release, a total of 21,187 acres, covering virtually all anomalies, was staked. Subsequently, exploration programs were filed by Sherritt Gordon, Hudson Bay Exploration and Development, and Granges Exploration in joint venture with Manitoba Mineral Resources Limited.

After release of the survey data, the EOB was involved in the Lynn Lake area only to monitor activity. The view of the EOB was that staking activity had been at a satisfactory level, and that no government effort was required because virtually all the anomalies had been acquired.

Because of the success of the first survey, the closing of the Farley mine, and the existence of additional favourable terrain in the Lynn Lake area, a second airborne INPUT survey was undertaken by EOB. The survey, known as phase II, covered an area of 4,000 square kilometers, more than three times the size of phase I. Estimated cost was \$300,000, and Management Committee approval was received on 11 May 1976. The survey was flown by Questor Surveys in October and November, and the results were released to the public in June 1977.

EOB exploration activities ceased shortly after the Progressive Conservatives took office in October 1977.

9. Analysis of Cases: Changes in Decision Structure

Introduction

The central questions in this study are: did the provincial and federal government policy changes over the period 1969 to 1977 significantly alter the decision-making structure in Manitoba relating to mineral exploration; and did the changes affect the relative autonomy of company managers to make exploration decisions? In this chapter, changes in the decision structure are examined.

The exploration decision itself, as well as a general decision structure, can each be divided into four components. The two sets of components can be combined (as shown in figure 1, chapter 1) to give a complete picture of the structure of mineral exploration decisions. Each pair of components will be examined, on the basis of information in the case studies, for evidence of change over the period 1969 to 1977.

As discussed previously, the relevant government policy changes included: increases in federal and provincial taxes and provincial royalties and fees; the entry of the provincial government into direct participation in the mineral industry through its Crown corporation, and the Exploration Operations Branch; and partnership arrangements with private companies.

Changes in the Structure of Exploration Decisions

DECISION MAKER/REGION

The regional decision essentially concerns the decision to explore or not to explore in Manitoba. Prior to 1969, virtually all such decisions were within the exclusive jurisdiction of private companies, and were made by their head offices. During and after the implementation of policy changes, company head offices continued to make this decision. In 1971, however, with the creation of Manitoba Mineral Resources Limited, and later through the EOB, provincial government managers began to participate in decisions to initiate exploration in Manitoba. This trend was further extended by Manitoba Regulation 328/74, which provided for government participation in industry exploration projects. In addition, the federal

government became involved in exploration in Manitoba through grants for mineral development from the Department of Regional Economic Expansion.

DECISION MAKER/AREA

Once Manitoba had been selected by a company as a region for mineral exploration, the head office, in conjunction with local managers, selected the area within which exploration should take place. This feature was more or less unchanged as a result of policy changes, although there was a tendency towards greater head office input during the period of transition. The creation of government agencies for mineral development meant that government managers also became involved in area decisions after 1971.

DECISION MAKER/RECONNAISSANCE

No changes occurred in private company authority to initiate reconnaissance activity. Companies were free to choose the time, method, and location of any sort of mineral reconnaissance. The Manitoba government entered this field as well, beginning with the Lynn Lake survey in 1976. (An earlier government airborne survey in the South Indian Lake region was related to hydroelectric development rather than mining).

The Geological Survey of Canada's program of geological mapping was not viewed as reconnaissance within the sequential exploration process.

DECISION MAKER/GROUND FOLLOW-UP

Ground follow-up decisions include ground acquisition, ground reconnaissance, line cutting, geophysics, and geochemistry, as well as diamond drilling. The evidence indicates that, assuming positive decisions on region, area, and reconnaissance, companies were as free to make ground follow-up decisions after the policy changes as they were before.

The implementation of Manitoba Regulation 328/74 introduced a new factor into decisions at this level, in that the Manitoba government gave itself an option to participate in all ground follow-up operations undertaken by private companies on non-order-in-council land, where expenditures were over \$10,000. If a company chose to explore on this type of land, it automatically chose to invite the government to be a partner.

However, operating decisions on projects conducted under agreements with the government were made exclusively by company managers once the agreements were signed. This is certainly clear in the case of Sherritt Gordon's drilling activities at Counsel Lake in 1977. Additional diamond drilling commenced before formal approval, or even submission, of an amendment to the joint venture agreement with the Manitoba government.

In addition to its joint venture activities, the provincial government was directly involved in ground follow-up activities through Manitoba Mineral Resources and the Exploration Operations Branch. The latter was not quite on an equal footing with private operators or with MMR in ground follow-up, because of the government policy of allowing thirty days following the release of government airborne survey results before EOB was permitted to begin staking.

OPTIONS/REGION, AREA, RECONNAISSANCE, AND GROUND FOLLOW-UP

Examination of the data indicated that, with a few exceptions, the options available to private sector managers in Manitoba did not change as a result of the mineral policy changes. One exception involves the ground follow-up decision, where the companies lost the option to work independently as a result of the Mineral Disposition Regulation.

A second exception was the change in work requirements for exploration permits, claims, and leases under the regulation, which reduced the options regarding the holding of claims and the timing of works and expenditures on claims. The Inco work on the Phillips Lake project, for example, was undertaken in early 1975 only because the work that had been done was insufficient to qualify for an explored area lease.

The options open to governments, on the other hand, changed at every level of the exploration decision. Before 1971, the Manitoba government had virtually no options with respect to active participation in mineral exploration. Following the establishment of Manitoba Mineral Resources, however, all levels of exploration decisions were opened to government participation. The decision makers of the Exploration Operations Branch enjoyed the same range of options, and government options were further increased by the introduction of participation agreements.

CRITERIA/REGION

In any economic system, the goals reflect the motivation of the individuals or institutions concerned. The traditional goal of the mineral industry has been economic reward. However, the criteria used by individual companies in pursuing this goal have varied according to company circumstances. This is particularly true in respect to regional exploration decisions, i.e., the decision to explore in Manitoba.

The goal of any mineral exploration is to find a mine that will be profitable, but the criteria for judging this varies. Noranda, for instance, as a large company with no mining or processing operation in Manitoba, required a deposit large enough to support an entire recovery and processing operation. Both Hudson Bay Mining and Smelting and Sherritt Gordon, on the other hand, had existing processing facilities and could have

made use of smaller deposits to augment their somewhat limited reserves. Inco had comfortable reserves for its nickel processing facilities, and consequently felt less pressure to explore widely in Manitoba. In essence, the smaller the proven reserves of a company with substantial capital investment in processing facilities, the greater the pressure to find more ore.

The entry of the Manitoba and federal governments into the mineral system led to the introduction of a new set of criteria into the mineral exploration decision structure. Although the profit motive was not discarded, the Manitoba government's basic concern was a redistribution of profits, to give a greater return from the province's mineral resources to the people of the province. The DREE/Manitoba agreement also gave priority to ensuring that the maximum benefit from future mineral development would accrue to the people of Manitoba, and to northern residents in particular. While concerned about social factors, the government of Manitoba also realized the need to have economic mineral production in the province, to support the cost of social programs.

CRITERIA/AREA, RECONNAISSANCE, GROUND FOLLOW-UP

As with the regional decision, area, reconnaissance, and ground follow-up decisions by private companies all pursued the ultimate goal of financial reward, but were based on different criteria, according to company needs. Government policy changes did not result in any significant changes in the criteria on which these components of the exploration decision were based.

For governments, once the regional decision had been taken, further criteria, in addition to income redistribution, came into play. Economic and social elements, such as employment, transportation, and regional development entered into area decisions, while reconnaissance and ground follow-up decisions were apparently based for the most part on economic and technical criteria.

PAYOFFS/REGION

The factors governing the payoff of an exploration decision at the regional level include:

- i the mineral sought
- ii the geology of the region
- iii the market situation
- iv company circumstances
- v infrastructure
- vi regulations, taxation, and political uncertainty
- vii attractiveness of other regions.

The major impact of government policy changes from 1969 to 1977 was felt in the area of regulations, taxation, and political uncertainty. The changes resulted in decreases in potential financial payoffs for private companies, largely through increased federal income taxes and provincial mining taxes and royalties.

Regional decision options for a private company are very wide, virtually world-wide for a large company. Within any region, the probability of finding an ore deposit that will be economic is related to the rules and taxes established by the political system. The more stringent the rules, and the higher the taxes, the lower the payoff and therefore the lower the probability of finding an ore body offering a competitive rate of return (figure 14).

It seems clear, therefore, that the increases in taxes, royalties, and fees, plus the increased regulation of the mineral industry in Manitoba, reduced the payoffs for Manitoba explorations by the private sector. The 1977 Noranda study of taxes in various jurisdictions rated Manitoba as last among Canadian provinces in terms of rate of return for a hypothetical new mine, and well down the list when compared with other countries (see table 5, chapter 2).

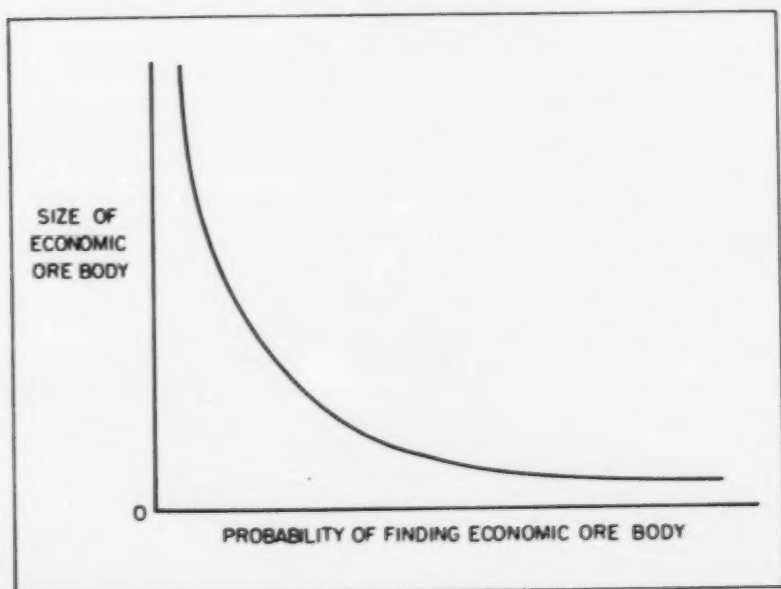


Figure 14. Relationship between size of economic orebody and probability of finding

From the point of view of the provincial government, the payoffs from involvement in the Manitoba mineral industry were increased by the policy changes. In addition to increased revenues from mining taxes and royalties and from land charges, the provincial government had also acquired access to a share in potential profits through its own independent activities and through the participation option.

Potential federal government payoffs increased somewhat with the increased income tax. The federal government also had the option, under the DREE agreement, to participate in exploration ventures to the extent of one-half of the Manitoba share.

PAYOFFS/AREA AND RECONNAISSANCE

The major change in payoffs for area and reconnaissance decisions came about as a result of the participation option. Since order-in-council lands were exempted from the provisions of the 1974 Mineral Disposition Regulation, they became more attractive to the companies which held them as areas for exploration. As a result, Inco restricted its exploration within Manitoba to these lands, while Sherritt Gordon and Hudson Bay Mining and Smelting were forced, because of company circumstances such as the need to find new ore reserves, to continue exploration on lands subject to the participation option.

PAYOFFS/GROUND FOLLOW-UP

The potential payoff from any form of ground follow-up exploration for private companies was decreased substantially by policy changes. The increased costs of acquiring permits and claims were a contributing factor, but more significant was the government's option to participate in up to 50 percent of any exploration project. The payoff losses to private industry had been converted directly into payoff gains for the provincial government.

Summary of Changes in Decision Structure

The government mineral policy changes over the period 1969 to 1977 can be divided into two classes: those which increased government participation in mineral exploration, and those which increased government revenues from the mining industry. As a result of the first class of changes, government participants were introduced into the decision structure at every level of exploration decision-making.

The major change in options resulting from government entry into the mineral industry was the fact that virtually all options were opened up to the provincial government, from the preliminary decision to explore in Manitoba to detailed technical decisions in ground follow-up. Private

companies, on the other hand, lost the option, in most cases, to decide whether or not ground exploration was to be conducted independently, or in partnership with the government.

Changes in criteria within the decision-making structure were also affected by the increase in government participation, as political and social criteria were added to economic criteria at all levels of the exploration decision.

Changes in payoffs were related to both classes of policy change. Increased taxes, royalties, and fees reduced the economic payoffs for private companies while increasing them for governments. Provincial government participation in the mineral industry gave it access to a share of after-tax profits, as well as more control over mineral system development within the province.

The shift in direction toward greater government involvement at all levels of the exploration decision is shown in figure 15.

Decision Structure	Trend in Relative Government/Business Involvement	
	More Business, Less Government	Less Business, More Government
Who makes decisions?	Government managers entered mineral system →	
Options	Business options reduced, Governments' increased →	
Criteria	Government introduced social criteria and altered economic criteria →	
Payoffs	Lower potential payoffs for business, higher for governments →	

Figure 15. Direction of changes in mineral exploration decision structure in Manitoba, 1969-77

10. Analysis of Cases: Results of Changes in Decision Structure

Exploration Decision Process

SHIFTS IN BARGAINING POWER

A rational decision process is characterized by such features as:

- i a single set of goals;
- ii an objective analysis of the available options in the light of the goals, based on good knowledge of all relevant factors;
- iii the final decision is a response to the set of goals, and is stated as either a single response or a sequence of conditional moves.¹

In the exploration decisions studied here, however, the evidence indicates that in some instances there was lack of agreement about potential payoffs and even about the goals to be met. This situation can certainly be seen in the decision of Hudson Bay Exploration and Development to terminate activity at Rusty Lake, and that of Sherritt Gordon to resume activity in Manitoba. Consequently, it seems more appropriate to use a political model of the decision-making process in this analysis.

Features of the political model used here include:

- i involvement of different people, different organizations, and even different goals;
- ii different perceptions of the results of pursuing various options;
- iii the differences are resolved through the process of bargaining;
- iv the final decision will be determined primarily by the bargaining power of the individuals involved. (Bargaining power results from a combination of bargaining advantages and skill.)²

1. See for example: Graham T. Allison, *Essence of Decision*, (Boston: Little, Brown & Co., 1971), pp. 32-33; G. B. Doern and Peter Aucoin, eds., *The Structures of Policy Making in Canada* (Toronto: The MacMillan Company of Canada, 1971), pp. 14-15; C. E. Lindblom, 'The Science of Muddling Through,' *Public Administration Review*, vol. 19, Spring 1959, pp. 77-88; Richard Zeckhauser and Elmer Schaeffer, *Public Policy and Normative Economic Theory*, in R. A. Bauer and K. J. Gergen, *The Study of Policy Formation* (New York: Free Press, 1968), pp. 27-102.

2. See Allison, *Essence of Decision*, pp. 162-73, and Lindblom, 'The Science of Muddling Through,' pp. 41-60.

Use of this model introduces a new element into the decision process which was not apparent in the discussion of decision structure: bargaining power. Bargaining power within a company has always been important. The bargaining strength of a company *vis-à-vis* government acquired heightened importance after the policy changes.

The bargaining power of various exploration decision makers underwent certain changes as a result of the 1969-77 policy changes. This meant that the location of decision making shifted. Prior to 1969, exploration decisions were made exclusively within private companies. Different people within companies participated in various levels of exploration decision making. In general, regional decisions were considered to be matters of company policy. They were made by the head office, on the basis of technical advice submitted by local management, combined with inputs relating to the overall condition of the company, markets, the political environment, and other relevant factors. Technical expertise provided the bargaining power of local managers, while broader management considerations, combined with inherent authority, formed the foundation of head office bargaining power. Area decisions were made at head office in consultation with local managers. Reconnaissance and ground follow-up decisions, the technical decisions, were in general left to the discretion of local managers.

TEMPORARY CENTRALIZATION

The 1969-77 policy changes led to shifts in the relative importance of different company participants in the exploration decision-making process. The period immediately preceding and following the major changes in early 1975 was characterized by a re-evaluation of company regional decisions to explore in Manitoba. Associated with this was a shift from the local office to head office, for reconnaissance and ground follow-up decisions. In some cases, local managers could not even decide to stake ground without approval from head office. After gaining experience with the new decision structure in Manitoba, and reaffirming their regional decisions to explore in Manitoba, responsibility for technical decisions was again delegated by head office to the local manager. This situation is well illustrated in both the Sherritt Gordon and Hudson Bay Mining and Smelting cases.

This suggests a phenomenon that may occur whenever there is a major change in government policy in an industry (figure 16). The concentration by top executives upon problems that are thrust upward in the organization in times of uncertainty or crisis will make demands upon the time of senior people and divert attention away from other aspects of their job. It can be imagined that this could cause problems, during a period when a number of new policy changes are introduced. The effect on local

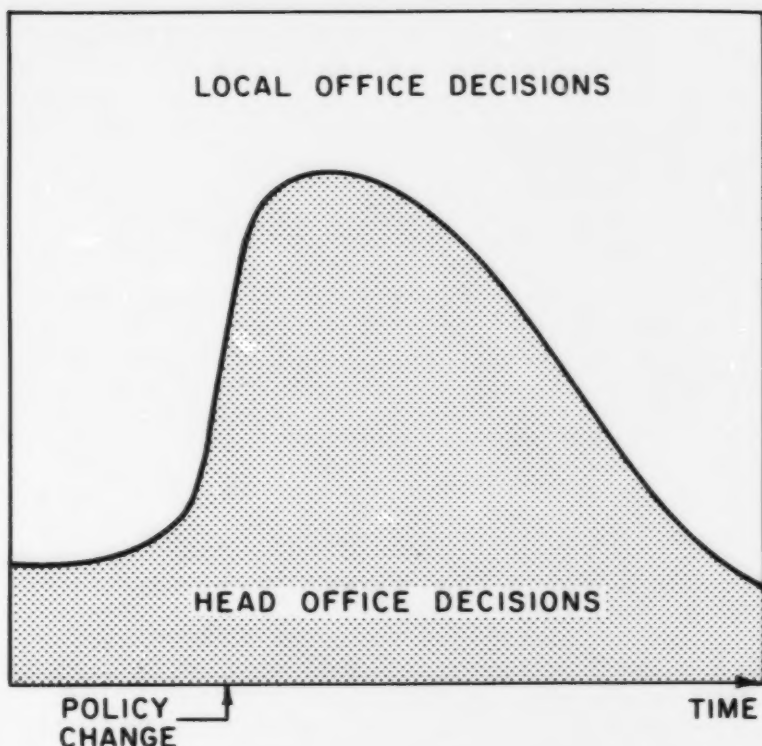


Figure 16. Change in distribution of decision-making activity as a result of policy change

managers of the shift in decision power should also be noted. It tends to create frustration, uncertainty, and resentment.

INCREASED GOVERNMENT INVOLVEMENT

Following the policy changes introduced over the period 1969-77, governments also became involved in making exploration decisions. Where government activities in mineral exploration were carried on unilaterally, the decision process closely resembled that of private industry in terms of both structure and bargaining power. The regional decision was a policy decision, made at the highest level of authority, with increasing inputs from technical experts as exploration decisions became more local and more specific.

More complicated shifts in bargaining power resulted from government-industry interaction following the policy changes, particularly in the

government participation agreements under the Mineral Disposition Regulation. If the temporary shift in decision making within companies can be considered vertical, then the acquisition of bargaining power by governments can be considered horizontal (as shown in figure 15), with a tendency toward greater bargaining power being vested in government participants.

TIME REQUIRED FOR EXPLORATION DECISIONS

The time scale of the decision process was changed as a result of the new decision structure, with considerably greater time being required in the initial stages of the new policies. Some of the companies noted that the considerable time required for discussions and negotiations contributed to a reassessment of their regional decisions.

The first joint exploration programs submitted to the government required substantially more time to prepare than had been the case for company programs. Sherritt Gordon, for example, reported that their first program required extensive detailing, and later, negotiation of changes. Subsequent submissions, however, were more routine and less time-consuming, because company management devised a form with standard unit costs and time for different activities. Hudson Bay Mining and Smelting also noted that, although the initial joint venture agreement negotiations were awkward and slow, later agreements were similar in administration to those with any other partners. Noranda also spent considerable time attempting (unsuccessfully) to negotiate an exploration agreement with the government.

The length of time required for ground follow-up decisions also increased in the initial stages of the new policy. In the Sherritt Gordon and Hudson Bay Mining and Smelting cases, for example, the shift of decision power to head office resulted in much slower follow-up decisions.

Management Decision Autonomy

This section examines the implications of the changes in the decision structure for the autonomy of private sector managers. The autonomy of management was deemed to have declined if one or more of the following occurred:

- i company managers lost the authority to make decisions;
- ii company managers lost options that had previously been available;
- iii company managers lost the freedom to specify the company goals;
- iv the payoffs from an option were changed to such an extent that the option effectively ceased to exist.

Examination of the case material reveals a decline in management autonomy, chiefly through the participation option contained in Regulation 328/74. As a result of this regulation, management lost the option for independent ground follow-up exploration. By this one change, mineral exploration and development changed from an entirely privately owned and operated activity to a quasi-nationalized activity.

In other areas, however, there was little loss of autonomy. The authority of company managers to make decisions, to choose between available options, and to act on the decision was unchanged. Company managers still had authority to take action regarding regional, area, reconnaissance, and ground follow-up decisions. The presence of the government as an operating decision maker in all these areas did not constitute a restriction of the authority of company managers.

In the analysis of changes in the decision structure, it was stated that policy changes left private sector managers with as wide a range of options for regional, area, and reconnaissance decisions as previously, but not for ground follow-up decisions. Although they still had a fairly full range of ground follow-up options, managers lost the option to undertake exploration independently. Other reductions in options were related to timing and to the amount of work required to maintain holdings.

The requirement to give government the option to become a partner had a further implication that was perhaps even more significant than the immediate loss of autonomy in that one area. The changed ownership structure of exploration projects meant that, although it was not the initial stated intent, the possibility existed that government managers could become active participants in private sector operating decisions.

The taxation changes introduced in Manitoba were not so punitive, in terms of decreasing the value of potential payoffs, that companies had absolutely no option but to refuse to explore in Manitoba. A policy of taxing private mining companies out of existence had been suggested by the Kierans Report, but was rejected by both Mr. Schreyer and Mr. Green. Therefore it can be stated that companies did not lose autonomy as a result of the tax increases and resulting decrease in payoffs from exploration in Manitoba.

Exploration Activity

The ultimate test of an exploration program, either private company or government, is whether or not mineral deposits are found that can be developed economically. From the introduction of the changes to mid-1977, there had been no successful discovery and development of a mine, although the uranium prospects in the northwestern area of the province were felt to be encouraging. The provincial policy changes were in effect

for too short a time to permit evaluation on the basis of success in finding new mines.

However, it was clear that, as a result of the policy changes, there was a reduction in private sector exploration. Information in table 4, chapter 2, indicates that exploration declined in 1975 in terms of the number of companies involved, the number of drilling reports, the meters of diamond drilling reported, the money spent, and the number of claims staked.

The increase in activity that occurred in 1976 was a direct result of government initiatives, such as the reconnaissance surveys in the Lynn Lake and northwestern areas of the province. In its efforts to stimulate exploration, the government was responsible for 37 percent, 45 percent, and 50 percent of exploration expenditures in 1975, 1976, and 1977 respectively. This represented a significant change in the balance between public and private sector participation in the mineral system.

11. Conclusions

The objective of this study was to examine the effects of changes in government mineral policies over the period 1969 to 1977 on the exploration decision-making process in Manitoba. The central question was: have these policy changes significantly altered the decision-making structure? In a word, the answer is yes; there was a shift in decision-making power from the private to the public sector. A second question then arises: have company managers lost autonomy? Again the answer is yes; the autonomy of company managers to make decisions has decreased, and the control of government managers has increased.

Decision Structure

The exploration decision structure changed as a result of new government policy. Decision structure was examined in terms of who makes exploration decisions, options available to managers, criteria for decisions, and the payoffs associated with different decision options.

DECISION MAKERS

Company managers were still involved as independent decision makers in making regional, area, reconnaissance, and ground follow-up exploration decisions after introduction of the new policies. Government managers became involved in all types of exploration operating decisions in the mineral industry.

OPTIONS AVAILABLE

With one major exception, the options available to private companies did not change as a result of the new mineral policy in Manitoba. The exception was the ground follow-up decision, where companies lost the option to conduct work independently. The options available to government managers increased from none at all to a wide range of options for all types of exploration decisions.

CRITERIA

The criteria upon which exploration decisions were based did not change for the private sector. They were still based on economic factors and could be reduced to a single common denominator: will the venture ultimately yield a profit? The entry of the government of Manitoba introduced a new set of criteria into the mineral system, based on the government's declared policy of seeking to increase the share of the people of Manitoba in the profits resulting from mineral exploration.

PAYOFF

Government policies changed the value of the payoffs associated with the options available to private companies. Tax increases and government participation decreased the potential payoff for company exploration and made Manitoba a less desirable location for private sector exploration. The decrease in payoff to the private sector became an increase for government, making the potential payoff for successful exploration greater for government than before.

Decision Process

Exploration decisions in the private sector were made in a manner best described by a political model of decision making, both before and after the changes in government policy. However, new participants were introduced to the process. Government personnel originally had not been significantly involved at any stage of exploration decision, but subsequently became involved as actors at all stages.

The method of resolving differences of opinion changed when the government became involved as a participant. Previously, the power derived from the authority structure in a company was the final method of resolving disputes. When government representatives assumed a role, as in joint venture agreements, they, and not top management of the company, frequently had final authority.

The exploration decision process within government was similar to that in companies and was best described in terms of the political model, although the participants were different, as was their ultimate responsibility.

Shifts in Autonomy

MANAGEMENT AUTONOMY

There was a decline in the autonomy of mining industry managers to make decisions. Autonomy was lost because private companies lost the option to undertake ground follow-up exploration independently. Mineral ex-

ploration and development in Manitoba changed from a privately owned and operated activity to a quasi-nationalized activity.

GOVERNMENT CONTROL

Establishment of a Crown corporation and activities within the Exploration Operations Branch gave the government complete control over their own exploration ventures. The participation option also potentially extended government control into the exploration operations of private companies at the ground follow-up level.

TRANSITION PERIOD

The transition period was a time of great uncertainty. During this period, there was a centralization of decision making within companies, with senior managers at head office becoming more involved in all types of exploration decision. As the situation stabilized, following implementation of the new policy, decision making shifted back toward local managers in Manitoba.

Some Significant Factors

COMPANY CIRCUMSTANCES

Certain factors were important in the exploration decisions of private companies, and in their reactions to the policy changes. One of these was the company situation concerning existing operations in Manitoba. Companies with no mines or processing facilities in the province found it easier to decide to give up exploration in Manitoba, while those with considerable capital investment were, in some cases, under pressure to find additional reserves. In addition, companies that were short of funds for exploration may have found Manitoba an attractive location for exploration because the province would assume a share of the costs.

AREA ATTRACTIVENESS

The attractiveness of order-in-council leases held by companies was enhanced by Regulation 328/74, relative to other land in the province. These renewable twenty-one-year leases gave the companies that held them exclusive rights to the land and exempted them from government participation in exploration programs.

The airborne reconnaissance surveys flown in the Lynn Lake and northwestern areas of the province by the government increased the attractiveness of these areas of exploration, by increasing the amount of information available, at no cost to private companies.

Effects on Exploration Decisions

EXPLORATION ACTIVITY

Up to 1977, no new mines had been found and developed since the policy changes. However, the policy changes had not been in place long enough to be evaluated on this basis in our study.

A decline in the level of exploration occurred when the government policy changes were under consideration, and immediately after their implementation in 1975. After some experience with the changes, activity increased to previous levels. The increase was, however, associated with significant government initiatives in exploration.

GOVERNMENT EXPLORATION

The assumption by governments of a more important management role in exploration in the province was significant. The government no longer functioned merely as stimulator or catalyst, but became an initiator and even leader of mineral exploration in the province.

Implications

This section outlines some of the implications of the Manitoba mineral policies for both governments and private companies. The implications can be extrapolated to governments and business in all jurisdictions where such policies may be implemented.

GOVERNMENT RESPONSIBILITIES

The assumption of the leadership role in mineral exploration by the government of Manitoba placed the onus upon government to produce results. If mineral exploration faltered, or was unsuccessful, it would have been the direct responsibility of the public sector. As an initiator, manager, and major participant in mineral exploration, the government exposed itself to a type of risk formerly undertaken only by private investors.

Assumption of this operational role also necessitated the development of relevant expertise within the department. As a consequence, more government personnel were needed for exploration, as well as for administration of agreements.

It requires a great deal of time to establish a successful rapport between governments and private companies involved in joint venture agreements. Considerable care must be taken to build and to maintain this rapport, if the policy is to function in a satisfactory manner.

Shared management responsibility may increase the amount of time required to initiate projects, and will certainly increase it if stalemates occur.

Reduction of payoffs to the private sector may have serious long-term implications for mineral development in any jurisdiction. If the rewards for finding and developing new mineral deposits do not result in a reasonable rate of return, investors will turn to other regions for exploration. A reduction in the overall level of exploration and consequently of mineral production in Manitoba would not have been in the best interests of government in terms of its policy goals.

When government is both the rule maker and a participant in mineral exploration, it wears two hats. This is a difficult role to play, but not an impossible one. Judgment, discretion, and maintenance of equity are essential, with a mixed public and private sector decision structure.

COMPANY RESPONSIBILITIES

The private sector had to recognize and adapt to the changed structure of decision making in order to continue exploration in Manitoba. In the past, most dealings with government had taken place on the consultative level. However, the new order of things required, in addition to consultation, the negotiation of contractual arrangements and joint participation in exploration. It therefore became essential for company managers to incorporate government positions and goals into their calculations in the course of decision making. In other words, private sector managers in mixed economies must recognize the public interest, as defined by government, and pattern their activities to coincide with it while, at the same time, making a profit for their shareholders. In some cases, it will also be necessary to accept government as the final authority in areas which previously have been the exclusive domain of the private sector.

With the opening up of the bargaining process to government participants, it has become essential for company managers to develop an understanding of what constitutes their bargaining strength, and learn how to negotiate with civil servants, and how and when to compromise.

Companies in mixed economies should be firm in their negotiations, and insist upon terms that will permit profitable operations. Ultimately, their power base and bargaining strength rest on their continuing success in finding and developing economic mineral deposits.

Afterword

On 11 October 1977, the Manitoba Progressive Conservative party, under Sterling Lyon, defeated the NDP government in a provincial election. This marked another major change in mining policy in Manitoba. Active government involvement in exploration decisions was replaced by a renewed reliance upon the private sector. No new participation agreements were signed, and existing agreements were transferred to Manitoba Mineral Resources. The Exploration Operations Branch was virtually dismantled by early 1978. The mineral royalty tax system was changed in the 1979 session of the Manitoba Legislature.

These policy changes might have been expected to lead to an increase in private mineral exploration. However, such effects have been difficult to observe, for a variety of reasons. First, companies were no longer required to submit as much data on exploration plans to the Manitoba government. Second, the depressed state of the nickel, copper, and zinc markets during 1978 did not encourage exploration for these minerals. Third, successful uranium exploration in Saskatchewan had a dampening effect on the growth of uranium exploration in northwestern Manitoba. The available evidence suggests that exploration in Manitoba remained at approximately the same level in the eighteen-month period following the October 1977 election as in the prior twelve-month period.

The change in policy does, however, afford a different perspective on some of our earlier conclusions and implications, since it gives another opportunity to observe change in the decision structure. The private enterprise thrust of the new government resulted in a reduction in the government's role in the decision structure. The new government decided to rely upon the private sector to undertake exploration in Manitoba, rather than picking up the slack left by the private sector. It encouraged the private sector to explore by making the environment (payoff) more attractive. It also approached the regional decision in a different way and, except for Manitoba Mineral Resources, did not engage in area, reconnaissance, or ground follow-up decisions.

The pre-October 1977 decision structure was not in place long enough to enable us to assess its potential for exploration success. On the other hand, the changes in government and subsequent changes in policy

vividly illustrate some of the difficulties inherent in government involvement in mineral exploration. Private companies require a period of time to establish exploration expertise in an area. For example, when Sherritt Gordon moved its activities to Ontario and then moved back to Manitoba a year later, the exploration personnel felt that they had lost more than one year in Manitoba. Similarly with governments: our research suggests that, if governments move alternately into and out of direct exploration, the consequence will be inefficiency. Private sector exploration will be discouraged, while governments will not have time to establish sufficient expertise to be effective. Similarly, money invested in participation agreements has a very low probability of being recovered, if such agreements are made by one government and discarded by the next.

Appendix I Summary of Changes in Federal Taxation of the Mineral Industry

Item	Pre-Reform	Tax Reform—1972	Budget—November 1974	Budget—23 June 1975
Tax rates	Basic rate of 50% of production profits of mining and petroleum corporations, subject to 10% provincial abatement applicable to all corporations.	As for other corporations, basic rate goes down one point annually after 1972 to 46% in 1976.	Basic corporate rate of 50% of profits, subject to new 15% resource profit abatement in addition to normal (10%) provincial abatement, effective 7 May 1974.	Effective 1 January 1976 basic corporate rate of 46%, 10% provincial tax abatement. 15% resource profit abatements to be withdrawn effective 1 January 1976.
		Tax abated 15 additional percentage points, together with cancellation of deduction of provincial mining taxes.		
Provincial mining taxes, royalties and other like payments	Deductible by mining and petroleum corporations.	Royalties and rentals generally deductible.	Effective 7 May 1974, all payments to provinces with respect to the acquisition, ownership, or development of a resource property no longer deductible by resource corporation in computing taxable income.	Nondeductibility of payments to provinces to continue, but resource allowance introduced effective 1 January 1976, in recognition of payments. Resource allowance deduction will be 25% of resource production profits calculated after operating expenses and capital cost allowance but before the deduction of interest expense, exploration and development, and earned depletion.
		Provincial mining taxes or income related royalties not deductible by mining corporations after 1976.		

Operators' depletion	Automatic depletion allowances permitted reduction of production profits by 33 1/3%.	Automatic depletion to continue to end of 1976. Thereafter, depletion 'earned' by eligible expenditures on exploration and development and certain capital expenditures, deductible at maximum rate of 33 1/3% of production profits.	\$3 of eligible expenditures after 7 November 1969 earn \$1 of depletion.	Rate of earning remained at \$1 of depletion for each \$3 of eligible expenditure.	Earned depletion system to commence effective 7 May 1974. Rate of claiming reduced to 25% of annual production profits from 33 1/3%.	No change from 18 November 1974 budget provisions. Earned depletion deduction to be claimed after deduction of 25% resource allowance, interest, and exploration and development.
Non-operators' depletion	Depletion allowance of 25%.	Rate of 25% continues to end of 1976. Thereafter, such rentals and royalties treated as production income for 33 1/3% earned depletion.	Effective 7 May 1974, rentals and royalties treated as production income eligible for earned depletion but annual rate of claiming reduced to 25% from 33 1/3%.	Effective 1 January 1976 new 25% resource allowance to apply to individuals as well as corporations with earned depletion rate of claiming at 25% per year after deduction of resource allowance, interest and exploration and development.		

Canadian
exploration and
development
expenses:

Principal
business
taxpayers

Deductible to extent of
income in year or any
subsequent year.

No change

Exploration expenditures
deductible at 100% or to
extent of income.
Development expenses,
including acquisition cost of
mineral properties, incurred
after 6 May 1974, deductible
at rate of 30% of unclaimed
balance.

No change from 18
November 1974 budget
provisions.

Nonprincipal
business
taxpayers

Deductible only from mining
income.

Deductible from income
from resource or 20% of
unclaimed balance,
whichever greater.

Expenditures incurred after
6 May 1974 deductible at
rate of 30% of unclaimed
balance.

No change from 18
November 1974 provisions.

Three-year
exemption from
income taxation.

Available to eligible new
mines.

Exemption terminated at
end of 1973. Accelerated
capital cost allowance
available for new mines and
major expansions.

No change

No change

Capital cost allowance (depreciation)	Buildings, mining machinery, and equipment at rate of 30% declining balance.	Accelerated depreciation on assets related to a new mine, to extent of income from the new mine (100%). Also applies to certain assets related to expansion of an existing mine where the milling capacity is increased by at least 25%.	No change	No change
Investment tax credit	Nil	Nil	Nil	Tax liability may be reduced by tax credit against federal income tax with credit developed at 5% of investment on specified items made in period between 23 June 1975 and 1 July 1977. Credit effective 24 June 1975.

Appendix II Private Sector Participants Reporting Mineral Exploration Activity in Manitoba, 1960-76

Company	Year																Number of Active Years	
	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75		76
Agassiz Mines							X											1
Alpha Mines									X	X			X					3
Amax Exploration								X	X	X	X	X	X					6
Amax Potash									X	X	X	X	X		X	X		7
Ansil Mines					X	X												2
Asarco Exploration							X											1
Backnick, Steve															X			1
Baker, F.												X	X					2
Banning, W. J.														X	X			2
Barringer											X	X	X	X				4
Barrington Lake Copper																X		1
Barta, J. B.							X			X								2
Bernic Lake									X			X						2
Bjornason, Ingi														X				1
Bjornason, W. F.													X	X				2
Black Hill Nickel Mine															X			1
Boudes, Louis															X	X		2
Bowden Lake Nickel Mines														X		X	X	3
Brabar Mines				X	X													2
Buff Gold Mining Syndicate		X																1
Bunn Lorne					X										X	X		3
Callicon Flin Flon Mines						X												1
Caltor Syndicate											X							1
Calverley, F.														X	X			2
Canadian Nickel	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X		15
Canadian Occidental														X	X	X		3
Canex Aerial Exploration											X							1
Canex Placier														X				1
Canol Mines																X		1
Central Manitoba Mines				X														1
Cerro Mining										X	X							2
Canhart Mines	X																	1

Appendix II Private Sector Participants Reporting Mineral Exploration Activity in Manitoba, 1960-76 (Continued)

Company	Year																Number of Active Years	
	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75		76
Chemallay Minerals	X	X							X		X	X						5
Churchill Basin Mines		X																1
Colcleigh, V.D.				X				X	X	X	X	X	X	X	X	X	X	11
Cominco							X		X	X	X	X	X	X	X			8
Conley, W.J.																X		1
Consolidated Mining		X			X													2
Consolidated Skeena										X								1
Conwest Exploration	X	X	X	X	X	X		X										7
Copper Man Mines							X	X										2
Coutts, R.C.		X																1
Cove Uranium	X																	1
Creelman, E.F.										X								1
Croiner Pershing Mines				X														1
Crown															X	X		2
Cyprus Exploration															X			1
Daniels, W.									X									1
Dawson, L.		X					X											2
Denison Mines		X														X		2
Denrow Mines		X																1
Don Minerals									X									1
Donner, J.		X					X		X	X	X	X						6
Dome Exploration									X	X	X				X	X	X	6
Ducanex Resources															X	X		2
Dunlop, W.B.			X			X	X		X		X		X	X			X	8
Dupont of Canada Exploration																X		1
Dynamic										X								1
Ecstall Mining													X					1
Elbow Lake Mines																X		1
Espina Copper Development																X		1
Falconbridge Nickel Mines	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	17
File Lake Exploration	X																	1
Fidelity Mining						X												1
Firth, D.A.	X																	1

Appendix II Private Sector Participants Reporting Mineral Exploration Activity in Manitoba, 1960-76 (Continued)

Company	Year																	Number of Active Years
	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	
Fosco Mining												X	X					2
Fox, S.E.								X										1
Freeport Exploration														X	X			2
Fundy Chemical												X						1
Gemini VII Mining							X											1
Gencona Mines							X	X										2
Gibson, J.C.				X														1
Gilmore, J.W.		X																1
Gordylad Mining							X											1
Granges, A.B.											X		X	X	X	X	X	6
Greenpoint Mines										X								1
Grindle, G.														X				1
Guggenheim Exploration							X	X	X	X	X	X	X					7
Gunner			X				X			X		X						4
Gulf Minerals																X		1
Hanson, O.					X													1
Hanson Mines										X								1
Hertz Reg. F.														X				1
Holden, M.G.	X			X														2
Holden, P.D.											X							1
Howell, H.										X								1
Hudman Mines										X								1
Hudson Bay Mining and Smelting				X											X			2
Hudson Bay Exploration and Development	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	17
Icon Syndicate		X	X															2
Inco		X	X	X		X	X	X	X	X			X	X		X		11
International Mine Services	X					X												2
Imperial Oil										X			X	X				3
Irwin, J. Foster												X						1
Jackson, A. L.		X																1
Jacobson, A.							X											1
Jacobson, H.O.							X					X						2
Janus Exploration											X							1
Jay Kay Exploration Syndicate	X																	1

Appendix II Private Sector Participants Reporting Mineral Exploration Activity in Manitoba, 1960-76 (Continued)

Company	Year																Number of Active Years	
	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75		76
Johnson, W.	X																	1
Jorex										X								1
Juma Mining and Exploration				X	X													2
Kaweeki Chemical									X									1
Kennco Exploration		X	X	X	X			X										5
Kennedy, C.S.											X							1
Kennedy Silver Mines								X										1
Kerr Addison Mines Ltd.				X	X	X	X	X							X			6
Kidd, R.												X		X				2
Kimberley								X	X									2
Knobby Lake											X		X	X	X		X	5
Kobar, W.B.	X	X	X		X	X		X	X		X			X			X	10
Kuryliw, C.													X	X				2
Laronge												X						1
Lavant Iron Mines	X																	1
Lee Gordon Mines				X														1
Lesavage, S. L.								X										1
Leslie, H. T.						X			X		X				X			4
Linda Mines Ltd.																	X	1
Lion Nickel Mines							X		X									2
Lithia Mines & Chemicals											X							1
Little, M.						X	X		X				X					4
Lode Mine		X																1
Longlac Mineral Exploration										X		X						2
M. J. Boylen Engineering								X										1
Magenta												X	X	X	X			4
Major, R & S																	X	1
Manitoba Mineral Resources Ltd.														X	X	X	X	4
Marmal Nickel Mines																	X	1
Marcon Mines				X	X													2
Maskwa Nickel Chrome Mines									X	X							X	3
Mattagami														X	X	X		3

**Appendix II Private Sector Participants Reporting Mineral
Exploration Activity in Manitoba, 1960-76 (Continued)**

Company	Year																Number of Active Years
	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76
Maverick Mines & Oils						X											1
McIntyre Porcupine Mines											X	X				X	3
McKay, Jeff		X															1
Meridian Mining & Exploration									X	X							2
Merritt Copper						X	X										2
Mickelson, A.																X	1
Minago											X	X	X	X			4
Mineral Mountain Mining										X							1
Minerals Technology Corporation									X								1
More Mines									X	X							2
Moreau Woodward & Co.							X										1
Morrison, B.														X			1
Murray J.		X	X			X	X										4
National Malarctic Gold			X														1
National Nickel									X								1
Neepawa Mines												X					1
New Forty Four Mines															X		1
Newconex Canadian Exploration				X													1
Newman Exploration											X	X					2
Newmont Mining Group		X	X	X													3
Nickel Belt Extension				X													1
Nor Acme Gold Mines											X	X					2
Noranda Exploration		X	X	X		X	X		X	X	X	X	X	X	X		12
Noranda Mines		X	X			X	X	X	X								6
North Frontier Exploration						X											1
Northern Eagle Mines									X								1
Norway Lake Iron Mine					X												1
Obaska Lake Mines											X						1
O'Brien Gold Mines											X		X				2

**Appendix II Private Sector Participants Reporting Mineral
Exploration Activity in Manitoba, 1960-76 (Continued)**

Company	Year																Number of Active Years
	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76
Obsniuk, S.							X										1
Osis, C.			X														1
Pan Canadian Development											X						1
Parres, A. L.	X			X		X	X	X	X		X	X	X		X	X	11
Parres, J. R. S.											X			X		X	3
Pascar Oil									X								1
Patina Mining Service	X																1
Pederson, J. C.									X								1
Petra Chromite															X		1
Petromines								X									1
Phelps Dodge Corp.	X	X	X										X	X			5
Pickering Metal Mines					X												1
Pinebat Mines																X	1
Pineroot Minerals								X	X	X							3
Portage Avenue Gold Mines															X	X	2
Potential Ore Exploration													X				1
Pronto Exploration															X		1
Prospectors Airways	X	X	X	X													4
Ranworth Exploration		X	X														2
Richards, B. R.			X														1
Rio Canadian Exploration		X															1
Rio Tinto Canadian Exploration		X	X	X													3
Roberts Mining								X									1
Robot & Bergsun Syndicate			X	X													2
Rock Ore Exploration & Development												X	X	X		X	4
Russel, G. A.		X															1
Ruttan Lake												X	X				2
Rylander, Fred																X	1
Ryanor Mining						X					X	X	X				4
San Antonio Gold Mines		X															1
Savoy Copper Mines		X															1

**Appendix II Private Sector Participants Reporting Mineral
Exploration Activity in Manitoba, 1960-76 (Continued)**

Company	Year																Number of Active Years
	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76
Schaller, E. E.	X																1
Scurry Rainbow Oil								X	X	X							3
Searchor										X							1
Selco Exploration		X	X	X	X	X		X	X				X	X	X		10
Semiahmoo Petro Mines											X						1
Setting Lake Nickel Mines															X	X	2
Sepotuk J.																X	1
Sheridan Gold Mines	X																1
Sherridan, J. P.	X		X														2
Sherritt Gordon		X	X		X	X		X		X	X	X	X	X	X		11
Sico Mining			X														1
Silver Standard Mines Ltd.																X	1
Simard, G.											X	X					2
Sourdough Bay Mines																X	1
Stall Lake											X						1
Steep Rock Iron Mine	X																1
Steinreiter, Hans													X	X		X	3
Stephannson N.				X													1
Strauss Exploration										X	X	X	X				4
Sudbay Exploration																X	1
Sulmac Exploration										X							1
Sutherland, A.													X				1
Syme, J.														X	X		2
Tanelay									X	X							2
Tantalum Mining								X	X			X		X	X	X	6
Teal, S.								X									1
Teck Exploration	X																1
Temanda Mines	X																1
Testex Ltd.	X																1
Texas Gulf Sulphur													X				1
Thompson Bros.	X		X			X											3
Thompson, G. F.					X												1
Thompson Mines																X	1
Thompson, N. L.																X	1
Tough, J.								X									1

Appendix II Private Sector Participants Reporting Mineral Exploration Activity in Manitoba, 1960-76 (Continued)

Company	Year																Number of Active Years	
	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75		76
Transtide Industries														X				1
Treehouse Mines															X			1
Tri J. Mineral Surveys								X				X	X	X				4
Trinity Chibougamou Mines		X																1
Tudale Exploration													X	X		X		3
United Siscoe Mines																X		1
Urangesellschaft Canada																X		1
Vermont Mines					X													1
Volray Exploration							X			X								2
Webb,T.R.				X	X	X												3
Western Nuclear								X	X		X							3
Winchell,D.T.					X													1
Winter,J.K.			X															1
Wynne Gold Mines															X	X		2
Yakamischak,M.														X				1
Yawchak,G.																X		1
Zeemel,A.O.																X		1
Ziyone,J.											X		X					2
Number of companies active	33	31	30	21	22	28	27	28	41	37	45	37	43	36	32	27	48	

Appendix III Terminology

Airborne EM equipment	consists of a large outside transmitting loop fixed to an aircraft, and a receiving coil towed behind the aircraft in a 'bird' (an aerodynamically designed cylinder).
Anomaly	a deviation from the norm in rock patterns, usually discovered by geophysical methods. An anomaly suggests the possibility of a mineral deposit, but only one of thousand of anomalies ever leads to a worthwhile discovery.
Area selection	the selection of a geographical area thought to be favourable for minerals sought. The area selected for study will then be examined closely, using geophysical and geological information made available by the exploration team. Initially, data will be gathered utilizing airborne magnetic and electromagnetic surveys. The results of this type of study will indicate location of possible mineralization within the area, i.e., identification of anomalies.
Assay	the testing of a sample of minerals or ore to determine the content of valuable minerals.
Base metal	a commercial metal such as copper, lead, or zinc. The term was coined to describe a metal 'inferior' to precious metals such as gold and silver.
Bedrock	the solid rock of the earth's crust, generally covered by overburden of soil or water.
Claim	an area of land or water 'claimed' by a prospector or mining organization, for the purpose of exploring for a certain length of time, subject to certain conditions; claims are first staked, then recorded in a government claim recording office. A common size of claim in Canada is about 40 acres.
Claim block	a plot of Crown land staked out or acquired for mineral exploration. A claim block generally comprises an area of 80 to 640 acres.
Concentrate	metal ore that has been separated from the gangue or associated rock.

Core	a cylindrical piece of rock that is extracted from the earth by a diamond drill. A diamond bit at the end of the drill cuts the rock as it is powered into the earth, and the cylindrical core is removed to the surface for examination and analysis.
Depletion	the steady decline in the amount of ore in a deposit or property resulting from production. Minerals are said to be a 'depleting resource' because, once mined, they cannot be replaced.
Development	means of proving or opening up a mineral deposit in preparation for mining; may include surface and underground diamond drilling, surface stripping, underground excavation, and erection of buildings and structures to be used in the mining or processing of minerals.
Dip needle	a type of compass that indicates magnetic attraction in rocks; the needle in the compass swings in a vertical plane.
Disseminated ore	ore carrying small particles of valuable minerals, spread more or less uniformly through the gangue matter; distinct from massive ore, wherein the valuable minerals occur in almost solid form with relatively little waste material included.
Drill	a machine for making holes in rock. Common types include churn, diamond, and rock rotary drills. They may be powered by compressed air, electricity, gasoline, or diesel motor.
Drill targets	the specific locations on an identified anomaly where diamond drill holes are made. The targets are identified through a step by step process ending with ground geophysical surveys.
Exploration	searching for minerals by prospecting; by geophysical, geochemical, or geological surveys; or by trenching, excavating, drilling, or other methods.
Fault	a break in the earth's crust, caused by forces which have moved the rock on one side with respect to the other. Ore deposits are commonly associated with faults, as the movement frequently provides a channel for the passage of ore-bearing solutions.
Gabbroic rock	loosely used, any coarse-grained dark igneous rock.
Gangue	the nonmetalliferous or nonvaluable metalliferous mineral in the ore.

Geophysics	a combination of the sciences of geology and physics; it is a technique that, among other things, measures the earth's magnetic conditions and its resistance to electrical currents.
Grab sample	a sample taken at random to determine if valuable elements are present.
Grassroots or greenfields exploration	exploration for minerals in areas in which there have been no previous economic discoveries.
Greenstone	a convenient field term used to describe fine-grained green volcanic rock. Intrusions of igneous rocks into greenstone belts present favourable areas for prospecting.
Ground acquisition	obtaining a mineral disposition
Ground geophysics	exploration of an area using geophysical methods, over a grid formed by line cutting. By interpretation of data concerning relative conductivity, depth of overburden, direction of strike and dip, the approximate width of a conductor may be determined.
Ground follow-up	an examination of anomalies identified by airborne surveys. Geophysical equipment is used, along with geological studies and, in some cases, geochemical methods.
Grubstake	money and/or supplies given to a prospector on the understanding that the supplier or financing party will share in any discovery the prospector may make.
Holder	a person who is the owner of a mineral disposition.
Industrial minerals	usually non-metallic minerals which are used in industry and manufacturing processes in their natural state, though generally with some beneficiation to imposed specifications; examples includes asbestos, salt, gravels, building materials, talc, and sands.
INPUT survey	a specific type of airborne geophysical survey conducted by Questor International Surveys.
Joint venture	an undertaking by two or more parties to work together to explore for minerals.
Lease (Manitoba)	a lease of a plot of Crown land, which may be acquired as: i. a production lease—in order to commence production from a mineral disposition—a production lease is issued for a term of ten years and is renewable for a further term of ten years, so long as production continues from the leased area.

ii. an explored area lease—in order to continue exploration in an area in which expenditures on exploration have already been made—an explored area lease shall be issued for a term of ten years and shall be renewable for one eleven-year term.

iii. an order-in-council lease: a renewable twenty-one-year lease, held in some areas of the province by Inco, Hudson Bay Mining & Smelting, and Sherritt Gordon Mines under the terms of the previous mining regulations and therefore exempt from the participation requirements of Regulation 328/74.

Line cutting	cutting passage-ways through the bush (or making lines over the terrain), which consist of base lines, with cross lines spaced at specified intervals. A group geophysical survey is conducted along the cross lines.
Magnetometer	an instrument used for measuring magnetic intensity.
Marginal ore	orebodies which are so low in grade that they are close to being uneconomic to mine.
Mill	a plant, usually at the mine site, which concentrates ore or treats it so that minerals are separated and prepared for ultimate recovery. A mill may also be a machine used in the initial treatment process for grinding the ore to the proper size for further treatment.
Mineral	a substance, which may or may not be of economic value, that occurs naturally in the earth. It is homogeneous, has a unique chemical makeup, and usually appears in crystal or grain form.
Mineral disposition	land held in the form of a claim, claim block, permit, or lease.
Mineral policy	the sum of government decisions or actions that influence the mineral system.
Mineral system	a series of activities that begins with the location of mineral resources in the ground and ends with final consumption of a mineral product. Encompasses the discovery, recovery, processing, and sale of mineral resources.
Mining recorder	a government official who records claims, collects fees, and confirms the right of the claim-stakers to the areas they have staked.
Noritic rock	a variety of gabbro.

Option	the right to have the first chance to buy or refuse to buy a property or an asset of some kind. In mining it often refers to a contract that covers a mining claim or group of claims.
Ore	a mixture of minerals and gangue from which at least one of the minerals can be extracted.
Ore reserves	known mineral deposits that can be mined profitably under given technical and economic conditions. They are reasonably well measured as to tonnage and grade.
Outcrop	solid rock or mineral that is exposed on the earth's surface and can be examined visually.
Overburden	soil, plant life, or water that covers the earth's rock.
Permit	an authorization for mineral exploration within a specified area; covers approximately 25,600-115,200 acres, may be held for three years.
Precambrian shield	the rocks of a certain geological age found in the Canadian Shield, a mineral-rich area that covers almost half of Canada.
Production	means of winning, taking, or carrying away of any mineral, mineral-bearing substance, or any product as a result of mining operations.
Program	work on a mineral disposition, prior to the issue of a production lease.
Prospect	a mining property, the value of which has not been proved by exploration.
Prospector	a person who has knowledge of the identification of rocks and minerals and engages in the search for mineral deposits.
Recovery	the amount of mineral in ore that is separated and recovered in a mill, usually expressed as a percentage per ton of ore treated.
Refining	the final purification process of a metal or mineral.
Region selection	the selection of a jurisdiction in which to carry out a search for minerals. Geological and political factors are of primary concern.
Royalty	money paid by the operator of a mining property to the actual owner of the mineral rights to the property. The royalty may be based on so much per ton produced or be a percentage of revenue or profits.

Smelting	the partial recovery of metal from processed ore; after being treated and concentrated at a mill, the ore is smelted to recover the metal content and to convert it to a form that is ready for refining.
Staker	a person in whose name an application to record a mineral disposition is made.
Staking	the measuring of an area and marking with stakes or posts to establish mineral rights.
Stripping	removal of the overburden covering an orebody.
Trenching	blasting a shallow trench, to uncover rock samples for examination and possible assaying, in order to examine an anomaly below the surface.
Ultrabasic; ultramafic	igneous rocks containing less than 45 percent silica, containing virtually no quartz or feldspar, and composed essentially of ferromagnesium silicates, metal oxides and sulphides, and native metals.
Vein	an opening, fissure, or crack in rock, containing mineralized material.

The Authors

William J. Kops graduated in Economics and Geography from the University of Manitoba in 1964, and went on to receive his degree of Master of Business Administration. Until 1974 he worked in various areas of personnel policies and practices for the Government of Manitoba. Following a year of lecturing in Marketing and Organization Behaviour in Australia, Mr. Kops joined the Department of Business Administration at the University of Manitoba as lecturer in Business and Management Studies.

Brian E. Owen received Bachelor's and Master's degrees in Agricultural Economics from the University of Manitoba, and from 1967 to 1969 was a research economist for Hedlin Menzies and Associates Ltd. In 1970 he received an MBA, and in 1976 a Ph.D. in Business Administration, from the University of Western Ontario. Since 1973 Dr. Owen has been a member of the faculty of Business Administration of the University of Manitoba, where he is now an associate professor. His interests lie in the areas of business policy, planning, government-business relations, and agribusiness.

The Centre for Resource Studies

The Centre was established in 1973 through the sponsorship of Queen's University, the federal Department of Energy, Mines and Resources, and The Mining Association of Canada. A multi-disciplinary research organization, it attempts to bring the knowledge, experience, needs, and views of individuals from governments, industry, universities, labour, and other interested groups to bear on important issues underlying mineral resource policy. Mineral resources considered by the Centre include the metallic, industrial and non-metallic, and structural minerals, but exclude petroleum and natural gas.

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